Vol. XVII
No. 12

INDUSTRIAL-ARTS MAGAZINE

December,
1928

Incorporating: HANDICRAFT and the ARTS AND CRAFTS MAGAZINE

Published Monthly by
THE BRUCE PUBLISHING CO.

Eastern Office:
50 CHURCH STREET
NEW YORK, N. Y.

354-364 MILWAUKEE STREET
MILWAUKEE, WIS.

Western Office:
53 W. JACKSON BLVD.
CHICAGO, ILL.

TABLE OF CONTENTS

Cooperation Between Education and Industry 423
Charles F. Bauder
The Vocational Evening School 426
Frank A. Maas
Pre-Convention Impressions of Philadelphia 429
Leonard W. Wahlstrom
Arousing Interest in Manual Arts 432
Geo. D. Henck
EDITORIALS: Provocational Work—Administration—Why Don't More Men Teach?—How to Resist the Salesman—Home Project Work—Something to Think About 434
Getting a Perspective for Vocational Guidance Through the Work Permit Office 436
Czarina J. Giddings
The Significance of Industrial Arts in Modern Education 441
John J. Hatch
What the Student Expects from the Industrial-Arts Instructor 443
Kenneth R. LaVoy
For the Cabinetmaker's Notebook 443
W. G. Hjerstedt

SUPPLEMENTS

Little Folks' Clothing Hangers ..... No. 116
Leon H. Baxter
Jig Saw ..... Nos. 117 and 118
Geo. D. Henck
Elementary Woodworking Joints ..... No. 119
John F. Faber and Jonathan Bright

PROBLEMS AND PROJECTS

Little Folks' Clothing Hangers 444
Leon H. Baxter
Elementary Woodworking Joints 444
John F. Faber and Jonathan Bright
Construction of a Bell or Buzzer 444
E. A. Rerucha
The High Jumpers 445
Margaret Fullerton
A Battery Charger 446
Charles Rice
Andirons 446
J. W. Bollinger
Art Fiber Work 447
Stanley Mythaler
Wrought-Iron End Tables 448
A. J. Werrell
Early American Scrolled Table and Colonial Mirror 448
Franklin H. Gottshall
Dresser Chest 450
W. H. Morton
Collapsible Poultry-Exhibit Crate 450
L. M. Roehl
A Device to Assist in the Grading of Mechanical Drawings 452
G. M. Quackenbush
Toothbrush Holder 453
C. Anthony Van Kammen
Easy Method of Teaching Electrical Direct-Current Mathematics 454
Edward B. Flaherty
Fitting Hinges 454
L. F. Hyatt
Ridges on the Crankshaft 456
Ray F. Kuns
Roman Brasier 456
C. O. Greenleaf
Cheap Soap and Clean Hands for Shop Classes 456
Carl J. Orness
Combination Radio Cabinet and Bookcase 456
H. B. Aram
Making Paneled Greeting Cards in the School Printshop 458
M. J. Haessly
Rimes by a Carpenter 458
A. E. Gray

Association and Convention Activities 459
Now, Are There Any Questions? 462
New Books 30a
Personal News Notes 32a
Publications Received 35a
School Shop Equipment News 36a
News and Notes 41a

Time to Bind Volume XVII of the INDUSTRIAL-ARTS MAGAZINE

The present issue finishes Volume XVII of the INDUSTRIAL-ARTS MAGAZINE. To get permanent benefit out of your subscription, bind the twelve numbers of the magazine which you received in 1928.

For this purpose the title page and index are included in this issue.

THE LAST CALL

Philadelphia with its historic, educational, industrial, and commercial surroundings invites you to the A. V. A. convention December 13, 14, and 15.

Don't fail to visit the commercial exhibits at convention headquarters.

(The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," the "Loyola Educational Index," and "Current Magazine Contents.")

Entered Jan. 2, 1914, as second-class mail matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1928, by Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, Jan. 16, 1917. Member Associated Business Paper and Audit Bureau of Circulation.

Subscription Information—Subscription price, $2.50 per year, payable in advance. Canadian and Mexican postage, 35 cents, foreign countries, 50 cents. Copies not over three months old, 25 cents; more than three months, 50 cents. Notices for discontinuance of subscription must reach Publication Office in Milwaukee, at least fifteen days before date of expiration. Changes of address should invariably include old as well as new address. Complaint of non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions—The Editors invite contributions bearing upon Industrial-Arts Education, Manual Training, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago; Philippine Education Co., Manila, P. I.

Accepted By Industry For Over Half A Century

Industrial standards are naturally the standards of the school shop. And "Star" Lathes have been accepted as standard in Industry for over fifty years.

Therefore, equipping the school shop with "Star" Lathes serves the community to the greatest advantage. Experienced instructors realize the advantage of training on "Star" Lathes. Boys so trained take their place in industry confident and of service to their employer because of their proper school shop training on the tools of industry.

A catalog of our complete line free on request.

Seneca Falls Machine Company

Seneca Falls, N. Y.

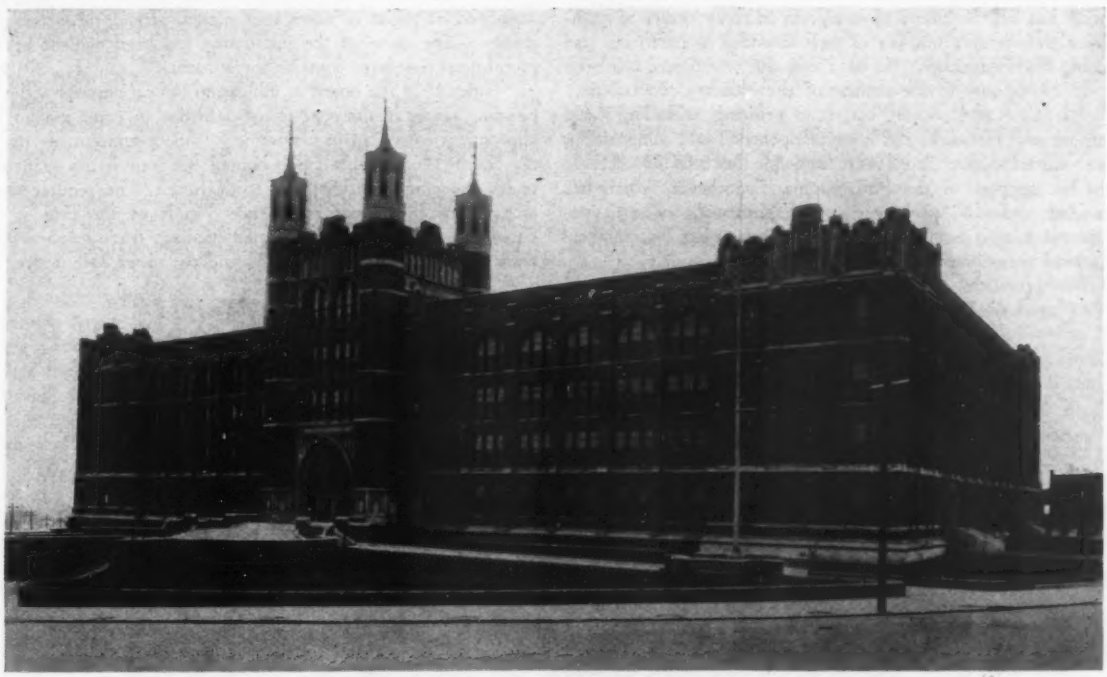
THE INDUSTRIAL ARTS MAGAZINE

Volume XVII DECEMBER, 1928 No. 12

COOPERATION BETWEEN EDUCATION AND INDUSTRY[1]

Charles F. Bauder, Director of Industrial Arts, Philadelphia; Chairman, Convention Management Committee, American Vocational Association

INDUSTRIAL EDUCATION in the Philadelphia public schools enjoys the approval and the active support of thirty influential industrial organizations representative of employers and labor. These groups are particularly interested in the program for cooperative instruction, and for part-time and evening extension training in which apprentices and other employees are given instruction supplementary to their daily work. The help of the schools has been apparent in the increased effectiveness of the student-workers.



THE OVERBROOK HIGH SCHOOL, PHILADELPHIA. OPENED SEPTEMBER, 1926

One of the most valuable features of the program is the half-time cooperative course given during the senior year in the industrial departments of Central High School, Northeast High School, and South Philadelphia High School. The boys spend half of the time in school and the other half in industrial plants, in alternate two-week periods. They are paid the usual apprentice wage for the time they work in the plant, and are routed among the various operations performed in the shop so that they secure all-around training.

During the past school year a total of 155 boys were placed under this plan, with sixty firms. Their average weekly wage was $11.25, and a total of $14,466 was earned during the year. More than 60 per cent of the graduates remained with their cooperative employers upon completion of the school course. Represented in this work were electrical contractors and equipment firms, pattern shops, mechanical engineers, machine shops, woodworking plants, architects, and building-construction firms.

The boys by this plan are initiated into the field of employment and production work under the supervision of the school. The break between school routine and the new condi-

[1]This article will be of special interest to the readers of the INDUSTRIAL-ARTS MAGAZINE because of the coming A. V. A. convention in Philadelphia on December 13, 14, and 15.

LINOTYPE OPERATION—PART-TIME CLASSES. EQUIPMENT PROVIDED BY PHILADELPHIA TYPOTHETAE. McCALL SCHOOL, PHILADELPHIA

tions of wage earning is minimized; the probability of success of a boy in employment is increased by the lessening of his embarrassment in the new environment through the constant care and guidance of his teachers.

The increasing interest of industry in the work of the schools has led the board of education in recent years to authorize a considerable number of new activities in part-time and evening trade education. In each case the new course has been set up in response to the request of the industry concerned.

Part-time and evening classes in printing, including hand composition, presswork, and linotype operation and composition, were started about four years ago in the McCall School, with the support of the Philadelphia Typothetae, which has provided about $75,000 worth of equipment. The Typographical Union has cooperated by encouraging its members to attend the school.

Many of the students are released from their regular employment to spend two or more afternoons per week in the school. Others who had formerly worked at printing come to the school to renew their knowledge of the craft so as to reenter employment in printing plants. Others, too, who are employed at night in newspaper offices, attend the afternoon classes. The value of the instruction has been evident in the promotions that have come to the students.

Since 1923 the board of education has cooperated with the building trades in the conduct of Saturday morning classes for apprentices employed in plastering. Ninety apprentices attend the South Philadelphia High School for four hours each Saturday morning from September to June. The regular wage is paid for the school attendance. Half of the time is devoted to giving instruction in plan reading, trade mathematics, trade science, civics and hygiene; and the other half is devoted

UNIT-TRADE CLASS IN TAILORING, McCALL SCHOOL, PHILADELPHIA

APPRENTICE INSTRUCTION, BRICKLAYING, McCALL ANNEX OF SOUTH PHILADELPHIA EVENING HIGH SCHOOL

to ornamental phases of plastering, such work as the apprentices would have little or no opportunity to learn on the actual job. Supplies for this work are provided gratis by the Van Sciver Corporation, one of the dealers in building materials.

The employers and the union have agreed to shorten the apprenticeship period by an amount equal to double the number of hours spent in the school. This action indicates that the instruction is functioning in the increased value of the boys to their employers and to themselves.

Two years ago, at the request of the Metal Manufacturers' Association of Philadelphia, the board of education authorized Saturday morning classes for apprentices in the metal trades—machinists, patternmakers, and molders. The instruction includes subjects related to the metal industries—blue-print reading, trade mathematics, trade science, English, and economics. No shopwork is done in the school, but the school shops are utilized for illustration of the related instruction. These classes are held at Central High School Annex, S. E. Broad and Green Streets.

Another group, which is interested in the values of part-time apprentice instruction, is the association of wall-paper wholesalers and retailers in Philadelphia. Saturday morning classes for paper hanging apprentices have been conducted in the McCall School, 17th and Delancey Streets, for two years. The instruction involves actual practice in the selection, trimming, and hanging of all varieties of wall paper.

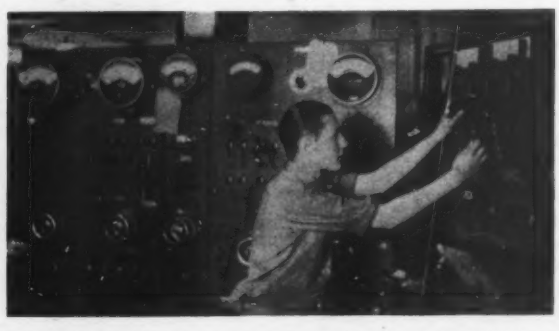
The Merchant Tailors' Exchange of Philadelphia two years ago requested the public schools to offer training in tailoring. The board of education responded by authorizing unit trade instruction in this subject at the McCall School. The pupils are between 14 and 16 years of age. They are given a short intensive course leading, in a year, to placement in tailoring establishments. Most of them lack the full requirements for entrance to the senior high school. The work has received the praise of the employing tailors. Many of the boys work in tailor shops in their spare time. All of them, upon completion of the one-year course, have been placed in satisfactory positions in the trade.

With the cooperation of the Textile Manufacturers' Association, evening classes were opened in 1925 in the Stetson Junior High School, B Street and Allegheny Avenue, for the improvement of textile workers. Mathematics, chemistry, design, fabric analysis, knitting, all definitely related to the industry, are taught. No shop practice has yet been attempted in these classes.

A request from the local association of painters and paint dealers was granted three years ago by the establishment of evening courses for apprentices and journeymen in the McCall School. Pigments, oils, varnishes, color harmony, and the mixing of paints for various purposes, are taught from a practical viewpoint, with considerable shop practice. For the past two years the apprentice classes have been conducted on Saturday mornings. The journeyman groups have continued in the evening organization.

Automobile mechanics in both day and evening schools has been greatly stimulated by the cooperation of the Automobile Trade Association of Philadelphia. This group has provided engines, ignition devices, axle assemblies, and other parts representative of modern cars.

PHILADELPHIA RETAIL MEAT DEALERS IN A TRADE IMPROVEMENT CONFERENCE, J. J. MATTHEWS, LEADER



COOPERATIVE STUDENT GETTING PRACTICAL EXPERIENCE IN THE TESTING DEPARTMENT OF THE CUTTER ELECTRICAL AND MANUFACTURING CO. SENIOR HIGH SCHOOLS, PHILADELPHIA

Two important developments of the past two years were the requests of the bricklaying leaders and the Electro-Platers' Society of Philadelphia for evening extension courses.

A committee on bricklaying instruction, made up of representatives of the Common Brick Manufacturers' Association, the Operative Builders' Association, the Builders' Exchange and Employers' Association, and the Bricklayers' Union, recommended that evening classes be organized for apprentice bricklayers. These classes are held two evenings per week in the McCall School, and a group is forming to meet on Saturday mornings. Brick supplies are provided by the Common Brick Manufacturers' Association. The classes are open to all apprentices in the trade.

The schools responded also to the request of the Philadelphia Branch of the American Electro-Platers' Society for evening classes in the science and technic of the art. The course is given in Kensington Evening High School, Coral and Cumberland Streets. All equipment and special supplies have been donated by manufacturers interested in this work. Classes are held for apprentices or helpers, and for foremen.

Foremanship improvement is the latest development in Philadelphia's program of extension education. During the past year the Division of Industrial Arts assisted the Division of Vocational Education of the State Department of Public Instruction in planning and reporting a series of conferences for the training of leaders for foremanship improvement in the metal trades of the city, in connection with the Metal Manufacturers' Association of Philadelphia. G. A. McGarvey, regional agent of the Federal Board for Vocational Education, conducted the first set of conferences. He was followed by J. J. Matthews, state supervisor of Industrial education, who has been assigned to the Philadelphia division of industrial arts to develop and carry on this work on a permanent basis. In addition to the training of leaders, conferences are being conducted for foremen of metal-trades plants, for proprietors of retail meat stores, and for executives of the local laundries, all in cooperation with the respective trade associations.

During the past year an army of 13,000 men and boys attended the evening and part-time schools, seeking self-improvement. Of them, 5,000 were in specific trade classes. Twenty trades were represented. The rapid growth of industrial education in Philadelphia in recent years demonstrates that the work of the schools is heartily appreciated by industry.

THE VOCATIONAL EVENING SCHOOL

Frank A. Maas, Milwaukee, Wis.

A WELL-CONDUCTED night school must necessarily have a complete and synchronized set of records. Advantages of records are numerous. In general, complete and well-kept records bespeak businesslike and efficient administration. A loosely conducted night school fails in approximating the fulfillment of the purposes of a night school.

A complete and accurate system of records makes a complete study of the school possible. Systemized evidence is the principal source through which the night school can be improved. From accurate and complete data it is possible to compute the per-pupil cost in the different subjects and in the school as a whole; to determine the average attendance; to find out the educational qualifications of students; to determine occupations of students; to determine geographical locations of pupils; to determine age of pupils; to determine the preparation of new and old students; to determine the trend of student needs; and to determine any other facts in which one might be interested.

Well-trained clerical help is very essential to the keeping of school records. It is good economy to save elsewhere rather than attempt to retrench at the expense of clerical efficiency. It is indeed embarrassing to any administration for someone to step into the office and present a receipt as evidence that he registered a month ago, but that he has received no word from the school, and then to find upon investigation that there is no evidence in the office of this registration. It is also embarrassing to be accused of falsifying data in official reports for lack of reliable data. These statements are more than hypothetic and conditions will always be unsatisfactory until night-school work is regarded as part of the regular school business, and that regular, reliable, and efficient administration personnel is required to conduct it.

Efficient registration means much to the success of night school. The registration blank (Form 1) requests the necessary data for a particular community. Before this form is filled out it is necessary that the applicant knows exactly for what he is registering. It is therefore necessary that the bulletins in which the courses are described, carry a complete and simple description of every course. Following is an example of a satisfactory description:

Armature Winding. This is a comprehensive course in the subject of direct-current and alternating-current armature winding. It is intended for electrical repairmen and winders, maintenance electricians, engineering students, and engineers.

D. C. Windings:

Classification of windings	3 units
Kinds of windings	14 units
Construction of coils	2 units
Testing	3 units
Design of windings	9 units
Actual armature winding	5 units

A. C. Windings:

Single-phase windings	5 units
Polyphase windings	6 units
Design of windings	20 units
Actual armature windings	5 units

REGISTRATION BLANK Receipt No.....

1. Name..... Date.....
2. Address (St. and No.)..... Age.....
3. Post Office .....
4. Where is this address located? (See other side.) .....
5. For whom do you work?.....
6. What work do you do?.....
7. School last attended..... Grade completed.....
8. Did you attend this school before?.....
9. What course did you take?.....
10. Have you read the note on the reverse side of this card?.....
11. What course do you want to take?.....

Assigned.....19.. Class..... Teacher.....
Transferred.....19.. Class..... Teacher.....
Evening Sessions E-1 10M 6-28 (Revised) John Doe School

FRONT

NOTE.—The sum of one dollar ($1.00) is required as a registration fee. This fee will not be returned.

The privilege of attending a class is forfeited if the student is absent, unless excused by the principal.

— City of Milwaukee
—*City of Cudahy
— City of North Milwaukee
—*City of South Milwaukee
—*City of West Allis
—*City of Wauwatosa
— Village of Fox Point
—*Village of Shorewood
— Village of West Milwaukee
— Village of Whitefish Bay
— Town of Franklin
— Town of Granville
— Town of Greenfield
— Town of Lake
— Town of Milwaukee
— Town of Oak Creek
— Town of Wauwatosa
— Outside of Milwaukee County

On the list below check the city, town, or village in which you live. * Students from these localities cannot be admitted without special permission from the Board of Vocational Education of their respective communities, unless they choose to pay their own tuition, amounting to 50 cents a week, payable in advance.

BACK

FORM 1. ORIGINAL, 4 BY 6-IN. CARD

This description leaves no doubt in the minds of the applicant as to the exact nature of the course. After the registration blank is filled out it should be carefully inspected and O.K'd by a supervisor, after which the registrant is ready to pay his registration fee and exchange the registration card for the assignment card shown in Form 2. The registration card

ASSIGNMENT CARD
Evening Sessions

Admit..... Date.....19...
Address..... Receipt No.....
To the.....class which meets every
.....and.....evenings in room.....
(.....floor).
The laboratory fee of $..... must be paid at the office before attending class.
Name of Instructor.....
To the Student: This card is to be handed to the instructor. Without it you cannot be admitted to his class.
The privilege to attend the class is forfeited if you are absent from any regular recitation unless you are excused by the principal.
To the Instructor: Please return this card to the office as soon as possible. If any student voluntarily withdraws, applies for transfer, or is absent three consecutive times without being excused, he is to be marked "withdrawn," and the required information is to be entered on the reverse side of this card.
Void if not used within one week

FRONT

WITHDRAWAL

Attended.....times. Absent.....times. .....%
.....
Reason for withdrawal.....
.....
Instructor.....
Deposit refunded.....19.. Refund approved.....
Principal
Readmit.....19... Teacher.....
Transfer to.....class.....19..
Name of teacher.....

BACK

FORM 2. ORIGINAL, 4 BY 6-IN. CARD

is then filed away according to classes. It is always better to make assignments at registration time if possible. The registrant then goes home with the exact information he came to obtain. He immediately begins making his plans for his first attendance. On the other hand, the longer he waits for information about his class assignment the more his interest wanes, and there is a possibility that he will not attend the school at all if he has to wait too long for his assignment.

It is very important that every teacher starts out right the first evening. For this purpose a short teacher's meeting should be held, at which a definite set of instructions to teachers should be discussed. A printed set of instructions should be placed in the hands of each one of the teachers so that each one is fully informed as to the objectives of the evening school, the meaning of the various printed forms, what is expected in the way of attendance from students, the time of the sessions, communications from the office, the keeping of records, the care and use of equipment, requisitions, withdrawals, excuses, transfers, computing attendance, teacher absences, how to stimulate regular attendance, substitutions, etc.

In order to avoid many misunderstandings and to call the teacher's attention to several pertinent and essential points which need to be attended to at the beginning of teachers' duties, a questionary similar to Form 3 should be filled out. Questions will have to be devised to fit the local situation, of course.

Upon entering the class, students should present their assignment cards. The teacher returns the assignment cards to the office where they are filed away according to classes, the corresponding registration card being taken out at that time to be filed away alphabetically according to the student's name. Students are given one week in which to report to class. If they do not report within this time their registration cards are taken out of the original file and filed away as students not reporting.

Form 4 is used by the instructors to obtain student information which is to be placed in the class record book.

Teachers should hold night-school students accountable for absences. If this is not done, students soon become careless and find themselves staying away from night school for trivial reasons. Form 5 must be filled out by a student who has been absent. This excuse blank must be signed at the office, before the student can be readmitted to his class.

Questionary
FOR NIGHT-SCHOOL TEACHERS
John Doe School
Please Return this Blank to the Office Promptly

NAME..... DATE.....
ADDRESS..... PHONE.....

1. Have you read "Instructions to Night-School Teachers, Supervisors, and Office Assistants"?
2. Have you read the "Rules and Regulations" regarding night-school attendance?
3. Have you read the instructions for the keeping of the night-school attendance records?
4. Do you understand that no student is to be admitted to your classes until the office issues an assignment card for such student?
5. Do you understand that students should not be permitted to continue in the laboratory classes who have not paid the required laboratory fees?

(Over)

FRONT

6. Do you understand that no students are to be excused by the teachers prior to 9:30, and that others leaving earlier than that time are to be recorded absent? (Excuses are to be handled exclusively by the office.)
7. Do you understand that your compensation is based largely upon the average number attending your classes each night, one dollar ($1.00) a night, plus 25 cents a student a night until a total of four dollars ($4.00) is reached?
8. Do you understand that your employment begins each evening at 7:00 o'clock, and that your compensation will be reduced 25 cents for each case of tardiness in excess of one each month? Tardiness is figured from 6:25 for classes beginning at 6:30.
9. Do you understand that classes are to be started promptly at 7:30, should not be dismissed until the ringing of the bell at 9:30, and that a record of tardiness is to be kept?
10. Do you understand that requisitions should be handed in a week in advance of the time when supplies are needed?
11. Do you understand that when supplies are sold, a cash receipt should be issued to each purchaser, and the cash should be turned into the office on that or the succeeding night?
12. Have you all necessary keys? (Teachers are expected to replace lost keys.)
13. Do you understand that at the close of each session, the room should be in as good order as it was when you entered, windows should be closed, lights should be turned out, and the doors should be locked?

BACK

FORM 3. TEACHERS' QUESTIONARY. ORIGINAL, 4 BY 6-IN. CARD

Evening School John Doe School
STUDENT'S ENROLLMENT BLANK
Information for Teacher's Register

1. Student's Name .....
2. Receipt Number..... Course.....
3. Address .....
4. Firm by whom employed.....
5. What do you do in your place of employment?.....
.....
6. What schooling have you had?.....
7. Why are you taking this course?.....
8. What position or job would you like to hold eventually?.....
.....
9. Date .....

FORM 4

John Doe School
READ THIS

Absence is always an injury to your classmates in preventing the class from making the greatest possible progress. Unnecessary absence is therefore properly regarded as an injustice to your classmates and to your instructor.

APPLICATION FOR EXCUSE
(Night Sessions)

Name .....
Class..... Date.....
Date of Absence.....
Name of Teacher.....
Cause of Absence.....
.....
.....
Approved by .....
(Principal)

FORM 5

Three absences in succession constitute a withdrawal and new applicants are assigned to the class. Special permission to reenter the class can be obtained from the office provided there is room in the class. Teachers should be alert to follow up an absent member by writing him a post card or calling him by telephone. This helps greatly to diminish absence. Form 6

PERCENTAGE -- OF -- ATTENDANCE TABLE

Directions for using. Read the percentage of attendance at the intersection of the horizontal "Times Present" and the vertical "Times Absent" columns.

Example: What is the percentage of attendance of a student who was present 23 times and absent 5 times?

Solution: The percentage (82.1) is found where line 23 crosses column 5.

TIMES PRESENT	TIMES ABSENT																									
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	100	50	33.3	25	20	16.7	14.3	12.5	11.1	10	9.1	8.3	7.7	7.1	6.7	6.3	5.9	5.6	5.3	5	4.8	4.5	4.4	4.2	4	3.8
2	100	66.6	50	40	33.4	28.6	25	22.2	20	18.2	16.7	15.4	14.3	13.3	12.5	11.8	11.1	10.5	10	9.5	9.1	8.7	8.3	8	7.7	7.4
3	100	75	60	50	42.9	37.5	33.3	30	27.3	25	23.1	21.4	20	18.8	17.6	16.7	15.8	15	14.3	13.6	13.1	12.5	12	11.5	11.1	10.7
4	100	80	66.8	57.2	50	44.4	40	36.4	33.3	30.8	28.6	26.6	25	23.5	22.2	21	20	19	18.2	17.4	16.7	16	15.4	14.8	14.3	13.8
5	100	83.5	71.5	62.5	55.5	50	45.5	41.7	38.5	35.7	33.3	31.3	29.4	27.8	26.3	25	23.8	22.7	21.8	20.9	20	19.2	18.5	17.9	17.2	16.7
6	100	85.8	75	66.6	60	54.5	50	46.1	42.8	40	37.5	35.3	33.3	31.6	30	28.6	27	26.1	25	24	23	22.2	21.4	20.6	20	19.3
7	100	87.5	77.7	70	63.6	58.3	53.8	50	46.6	43.8	41.2	38.9	36.8	35	33.3	31.8	30.5	29.2	28	26.9	25.9	25	24.1	23.3	22.5	21.8
8	100	88.8	80	62.7	66.6	61.5	57.1	53.3	50	47.1	44.4	42.1	40	38.1	36.3	34.8	33.4	32	30.7	29.6	28.6	27.5	26.7	25.8	25	24.2
9	100	90	71.8	75	69.2	64.3	60	56.3	52.9	50	47.3	45	52.8	40.9	39.2	37.5	36	34.6	33.3	32.1	31	30	29	28.1	27.3	26.6
10	100	90.9	83.3	76.9	71.4	66.6	62.5	58.8	55.5	52.6	50	47.6	45.4	43.5	41.7	40	38.4	37	35.7	34.4	33.3	32.2	31.2	30.3	29.5	28.6
11	100	91.6	84.6	78.5	73.3	68.8	64.7	61.1	57.9	55	52.4	49.9	47.9	45.9	44	42.2	40.7	39.3	37.8	36.6	35.4	34.3	33.3	32.5	31.5	30.5
12	100	92.3	85.7	79.9	75	70.6	66.6	63.1	60	57.1	54.5	52.2	50	48	46.1	44.4	42.8	41.3	40	38.6	37.4	36.4	35.4	34.3	33.2	32.4
13	100	92.8	86.6	81.3	76.4	72.2	68.4	65	61.9	59	56.6	54.2	52	50	48.1	46.4	44.7	43.3	41.9	40.6	39.4	38.4	37.2	36	35.1	34.2
14	100	93.2	87.5	82.3	77.7	73.6	70	66.6	63.6	60.9	58.4	56	53.8	51.8	50	48.2	46.6	45.1	43.7	42.4	41.3	40	38.8	37.8	36.8	35.8
15	100	93.8	88.2	83.3	78.9	75	71.4	68.1	65.3	62.6	60	57.6	55.5	53.5	51.6	50	48.3	46.8	45.5	44.3	42.9	41.6	40.5	39.5	38.4	37.5
16	100	94.1	88.8	84.2	80	76.2	72.6	69.6	66.7	64	61.4	59.2	57.1	55	53.3	51.5	50	48.5	47.2	45.8	44.3	43.2	42	41	40	39
17	100	94.4	89.4	85	80.9	77.2	74	70.9	68	65.3	62.9	60.7	58.5	56.6	54.7	53	51.5	50	48.6	47.1	45.9	44.7	43.5	42.5	41.5	40.5
18	100	94.7	90	85.7	81.7	78.3	75.1	72	69.1	66.6	64.3	61.9	59.9	58	56.2	54.5	53.1	51.5	49.9	48.6	47.3	46.1	45	43.9	42.8	41.8
19	100	95	90.4	86.3	82.7	79.2	76	73	70.3	67.8	65.4	63.3	61.2	59.3	57.6	56.1	54.3	52.6	51.3	50	48.6	47.8	46.4	45.2	44.1	43.3
20	100	95.2	90.8	87	83.4	80	76.8	74	71.4	68.8	66.6	64.4	62.4	60.6	59	57.2	55.4	54	52.6	51.2	50	48.8	47.6	46.4	45.6	44.4
21	100	95.3	91.4	87.6	84	80.6	77.7	75	72.2	69.9	67.6	65.5	63.6	62	60.1	58.2	56.7	55.2	53.8	52.5	51.2	50	48.7	47.9	46.6	45.6
22	100	95.7	91.7	88	84.5	81.4	78.5	75.7	73.3	70.8	68.6	66.7	64.9	62.9	60.9	59.4	57.9	56.3	55	53.7	52.4	51	50	48.8	47.7	46.9
23	100	95.9	92	88.3	85.1	82.1	79.1	76.6	74.1	71.8	69.7	67.9	65.8	63.7	62.1	60.5	58.9	57.5	56.1	54.7	53.4	52.4	51.1	49.9	49	47.8
24	100	96	92.2	88.8	85.7	82.6	79.9	77.3	74.9	72.7	70.8	68.6	66.5	64.8	63.1	61.4	60	58.6	57.1	55.7	54.7	53.3	52.1	51.1	49.9	49
25	100	96	92.5	89.3	86	83.3	80.5	78	76	73.8	71.5	69.3	67.5	65.8	64	62.5	61	59.5	58	57	55.5	54.3	53.3	52	51	50
26	100	96.2	92.8	89.4	86.6	83.7	81.1	78.8	76.7	74.4	72	70.2	68.4	66.6	65	63.4	61.9	60.3	59.3	57.7	56.4	55.4	54.1	53	52	51
27	100	96.4	92.9	89.9	86.9	84.2	81.8	79.7	77.2	74.8	72.9	71	69.1	67.5	65.9	64.3	62.6	61.6	59.9	58.6	57.5	56.2	55.1	54	52.9	51.8
28	100	96.3	93.2	90.2	87.4	84.8	82.6	80.1	77.6	75.6	73.6	71.7	70	68.3	66.6	65	63.8	62.2	60.8	59.6	58.2	57.1	56	54.9	53.8	52.9
29	100	96.6	93.4	90.5	87.9	85.6	82.9	80.3	78.3	76.3	74.2	72.5	70.8	69	67.3	66.1	64.4	62.9	61.8	60.3	59.2	58	56.8	55.7	54.8	53.7
30	100	96.6	93.6	90.9	88.5	85.8	83.1	81	78.9	76.8	75	73.2	71.4	69.6	68.4	66.6	65.1	63.9	62.4	61.2	60	58.8	57.6	56.7	55.5	54.3
31	100	96.7	93.9	91.5	88.7	85.9	83.7	81.5	79.4	77.5	75.6	73.8	71.9	70.7	68.8	67.3	66	64.5	63.2	62	60.8	59.5	58.6	57.4	56.1	55.5
32	100	97	94.4	91.5	88.6	86.4	84.2	81.9	80	78.1	76.2	74.2	73	71	69.4	68.2	66.6	65.3	64	62.7	61.4	60.5	59.2	57.9	57.3	56
33	100	97.4	94.4	91.4	89.1	86.8	84.5	82.8	80.5	78.5	76.6	75.2	73.3	71.6	70.3	68.6	67.3	66	64.7	63.4	62.4	61.1	59.7	59.1	57.8	55.1
34	100	97.2	94.2	91.8	89.4	87	85	83	80.9	78.9	77.5	75.5	73.8	72.4	70.7	69.4	68	66.6	65.3	64.3	62.9	61.5	60.9	59.5	58.5	57.5
35	100	97	94.5	92.1	89.6	87.5	85.4	83.3	81.2	79.8	77.7	76	74.6	72.8	71.4	70	68.6	67.2	66.2	64.8	63.4	62.7	61.3	60.2	59.2	58.5
36	100	97.2	94.7	92.2	90	87.8	85.7	83.5	82.1	79.9	78.1	76.7	74.9	73.4	72	70.6	69.1	68	66.6	65.2	64.4	63	61.9	60.8	60.1	59
37	100	97.3	94.7	92.5	90.3	88.1	85.8	84.4	82.1	80.3	78.8	77	75.5	74	72.5	71	69.9	68.5	67	66.2	64.8	63.6	62.5	61.8	60.9	59.6
38	100	97.3	95	92.7	90.4	88.2	86.6	84.4	82.5	80.9	79	77.5	76	74.5	73	71.8	70.3	68.8	68	66.5	65.4	64.2	63.5	62.3	61.2	60.4
39	100	97.5	95.2	92.8	90.5	88.9	86.6	84.6	83.1	81.1	79.6	78	76.4	74.9	73.7	72.2	70.6	69.8	68.3	67.1	65.9	65.1	64	62.8	62	60.8
40	100	97.6	95.2	92.8	91.2	88.8	86.8	85.2	83.2	81.6	80	78.4	76.8	75.6	74	72.4	71.6	70	68.8	67.6	66.8	65.6	64.4	63.6	62.4	61.6
41	100	97.6	95.1	93.5	91	89	87.3	85.3	83.6	82	80.4	78.7	77.5	75.9	74.2	73.4	71.8	70.5	69.3	68.5	67.2	66	65.2	64	63.1	62.3
42	100	97.4	95.8	83.2	91.1	89.5	87.4	85.7	84	82.3	80.6	79.4	77.7	76	75.2	73.5	72.2	71	70.1	68.9	67.6	66.8	65.5	64.7	63.8	62.6
43	100	98	95.5	93.3	91.6	89.4	87.7	86	84.3	82.6	81.3	79.6	77.8	77	75.3	74	72.7	71.8	70.5	69.2	68.4	67.1	66.2	65.4	64.1	63.2
44	100	97.7	95.5	93.7	91.5	89.8	88	86.2	84.5	83.2	81.4	79.6	78.8	77	75.7	74.4	73.5	72.2	70.8	70	68.6	67.8	66.9	65.6	64.7	63.8
45	100	97.7	95.9	93.6	91.8	90	88.2	86.4	85.1	83.3	81.5	80.6	78.8	77.4	76.1	75.2	73.8	72.5	71.6	70.2	69.3	68.4	67.1	66.2	65.3	64.4
46	100	98	95.7	93.8	92	90.2	88.3	86.9	85.1	83.3	82.3	80.5	79.1	77.7	76.8	75.4	74.1	73.1	71.8	70.8	69.9	68.5	67.6	66.7	65.8	64.9
47	100	97.8	95.9	94	92.1	90.2	88.8	87	85.1	84.1	82.3	80.8	79.4	78.5	77.1	75.7	74.7	73.3	72.4	71.4	70	69.1	68.2	67.2	66.3	65.8
48	100	97.9	96	94.1	92.2	90.7	88.8	86.9	85.9	84	82.6	81.1	80.1	78.7	77.3	76.3	74.9	73.9	73	71.5	70.6	69.6	68.6	67.7	67.2	65.8
49	100	98	96	94.1	92.6	90.7	88.7	87.7	85.8	84.3	82.8	81.8	80.4	78.9	77.9	76.4	75.6	74.5	73	72	71.1	70.1	69.1	68.6	67.1	66.2
50	100	98	96	94.5	92.5	90.5	89.5	87.5	86	84.5	83.5	82	80.1	79.5	78	77	76	74.5	73.5	72.5	71.5	70.5	70	68.5	67.5	66.5
51	100	97.9	96.4	94.4	92.3	91.3	89	87.7	86.2	85.2	83.6	82.1	81.1	79.6	78.5	77.5	76	75	74	72.9	71.9	71.4	69.9	68.9	67.8	67.3
52	100	98.3	96.2	94.1	93.1	90.8	89.4	87.9	86.8	85.3	83.7	82.7	81.1	80	79	77.5	76.4	75.4	74.4	73.3	72.8	71.2	70.2	69.2	68.6	67.6
53	100	98.1	95.9	94.9	92.5	91.2	89.6	88.5	86.9	85.3	84.3	82.7	81.6	80.6	79	77.9	76.9	76	74.7	74.2	72.6	71.6	70.5	70	68.9	67.8
54	100	97.7	96.7	94.3	92.9	91.3	90.2	88.6	86.9	85.9	84.2	83.2	82.1	80.5	79.4	78.3	77.2	76.1	75.6	74	72.9	71.8	71.3	70.2	69.1	68
55	100	98.5	96	94.8	93	91.9	90.2	88.6	87.5	85.8	84.7	83.6	82	80.9	79.8	78.7	77.6	77	75.4	74.3	73.2	72.6	71.5	70.4	69.3	68.8
56	100	97.8	96.3	94.6	93.5	91.8	90.2	89	87.4	86.2	85.1	83.4	82.3	81.2	80.1	79	78.4	76.7	75.6	74.5	73.9	72.8	71.7	70.6	70	
57	100	98	96.3	95.2	93.5	91.7	90.6	88.9	87.8	86.6	84.9	83.8	82.7	81.5	80.4	79.8	78.1	77	75.8	75.2	74.1	73	71.8	71.3		
58	100	98	96.9	95.1	93.4	92.2	90.5	89.3	88.2	86.4	85.3	84.1	82.9	81.8	81.2	79.5	78.3	77.1	76.6	75.4	74.2	73.1	72.5			
59	100	98.5	96.7	95	93.8	92	90.9	89.7	87.9	86.7	85.6	84.4	83.2	82.6	80.8	79.7	78.5	77.9	76.7	75.5	74.3	73.8				
60	100	98.4	96.6	95.4	93.6	92.4	91.2	89.4	88.2	87	85.8	84.6	84	82.2	81	79.8	79.2	78	76.8	75.6	75					
61	100	98.2	97	95.2	93.9	92.7	90.9	89.7	88.5	87.2	86	85.4	83.6	82.4	81.1	80.5	79.3	78.1	76.9	76.3						
62	100	98.6	96.7	95.5	94.2	92.4	91.1	89.9	88.7	87.4	86.8	84.9	83.7	82.5	81.8	80.6	79.4	78.1	77.5							
63	100	98.3	97	95.8	93.9	92.6	91.4	90.1	88.8	88.2	86.3	85.1	83.8	83.2	81.9	80.6	79.4	78.6								
64	100	98.6	97.3	95.4	94.1	92.8	91.5	90.2	89.6	87.7	86.4	85.1	84.5	83.2	81.9	80.6	80									
65	100	98.8	96.9	95.6	94.3	93	91.7	91	88.1	87.8	86.5	85.8	84.5	83.2	81.9	81.3										
66	100	98.3	97	95.7	94.4	93.1	92.4	89.4	89.1	87.8	87.1	85.8	84.5	83.2	82.5											
67	100	98.5	97.2	95.8	94.5	93.8	90.8	90.5	89.1	88.4	87.1	85.8	84.4	83.8												
68	100	98.6	97.2	95.9	95.2	92.2	91.8	90.4	89.8	88.4	87	85.7	85													
69	100	98.7	97.3	96.6	93.5	93.2	91.8	91.1	89.7	88.3	86.9	86.3														
70	100	98.7	98	94.9	94.5	93.1	92.4	91	89.6	88.2	87.5															
71	100	99.4	96.3	95.9	94.4	93.7	92.3	90.9	89.5	88.8																
72	100	97.6	97.2	95.8	95	93.6	92.2	90.7	90																	
73	100	98.6	97.1	96.4	94.9	93.4	92	91.3																		
74	100	98.4	97.7	96.2	94.7	93.2	92.5																			
75	100	99	97.5	96	94.5	93.7																				

J.J.M.

FORM 9. ACTUAL SIZE

is a post card which is specially printed to assist the teacher in this follow-up work.

The office should be very prompt to notify registrants when numbers are too small to organize a class or if there is to be a considerable delay before a class is started.

Form 7 is used by the teacher to report attendance at each session. The report should be made every evening and results tabulated the following morning to indicate the trend of attendance.

JOHN DOE SCHOOL

Milwaukee, Wis., ...192..

My Dear Mr. .....

I noticed your absence from class last .....evening with regret, and trust that you will again be present at our next meeting.

If you experience any personal difficulty with your schoolwork, I shall be glad to give you all the individual help you may need.

Cordially yours,

.....

Instructor

FORM 6. ORIGINAL, REGULAR POST CARD

JOHN DOE SCHOOL
Night-School Attendance Record

Date ..... Subject .....
Teacher ..... Room ..... Nights .....
Substitute .....

Previous Enrollment	Additions	Withdrawals	Present Enrollment	Present	Absent
Men					
Women					
Total					

Return to office each evening before going home

FORM 7

Many students desire some sort of evidence of attendance at the end of the year. Employers often base promotions upon successful night-school work and a certificate is much valued for such purpose. A simple certificate of small dimensions, such as is shown in Form 8, answers the purpose.

THIS CERTIFIES

That .....
has attended the John Doe School .....*nights*
during the school year 192...192..., Subject .....
.....*Teacher*

FORM 8. ORIGINAL 3½ BY 6-IN. CARD

Before closing the year's work, there yet remains the irksome task of computing the average attendance of each student. This laborious task is simplified greatly by means of the table shown in Form 9, a copy of which is given to each teacher. The teacher simply indicates the number of times a given student was present in the vertical column, and the number times this same student was absent in the horizontal line. The number at the intersection of the rows of numbers will represent the percentage of attendance.

The final act of the teacher is to fill out the closing report shown in Form 10. This closing report assists the teacher and the office in checking whether all of the items that must be attended to have actually been taken care of.

Night School
INSTRUCTOR'S CLOSING REPORT

Please Hand In This Report at the Office on Your Closing Night

HAVE YOU—

1. Turned in all keys charged to you, each one being properly labeled?
2. Turned in all schoolbooks? .....
3. Turned in your class record books, properly filled out, and totaled? .....
4. Turned in your inventory of equipment? .....
5. Left everything in good order and securely locked? .....
6. Left your forwarding address? .....
7. Turned in all school money in your possession? .....
8. Closed all accounts with the school? .....
9. Returned all borrowed equipment? .....
10. Arranged for the disposition of any of the above? .....
11. If so, with whom? .....

FRONT

INSTRUCTOR'S SIGNATURE .....
FORWARDING ADDRESS .....
.....
.....
.....

The above has been examined and found to be correct.

Signed: .....
.....
Supervisors

NOTE:—The instructor's work is not considered completed until this blank is turned in with the signatures of the supervisors attached. The payment of the last month's salary is contingent upon the completion of this work.

BACK

FORM 10. ORIGINAL, 4 BY 6-IN. CARD

PRE-CONVENTION IMPRESSIONS OF PHILADELPHIA

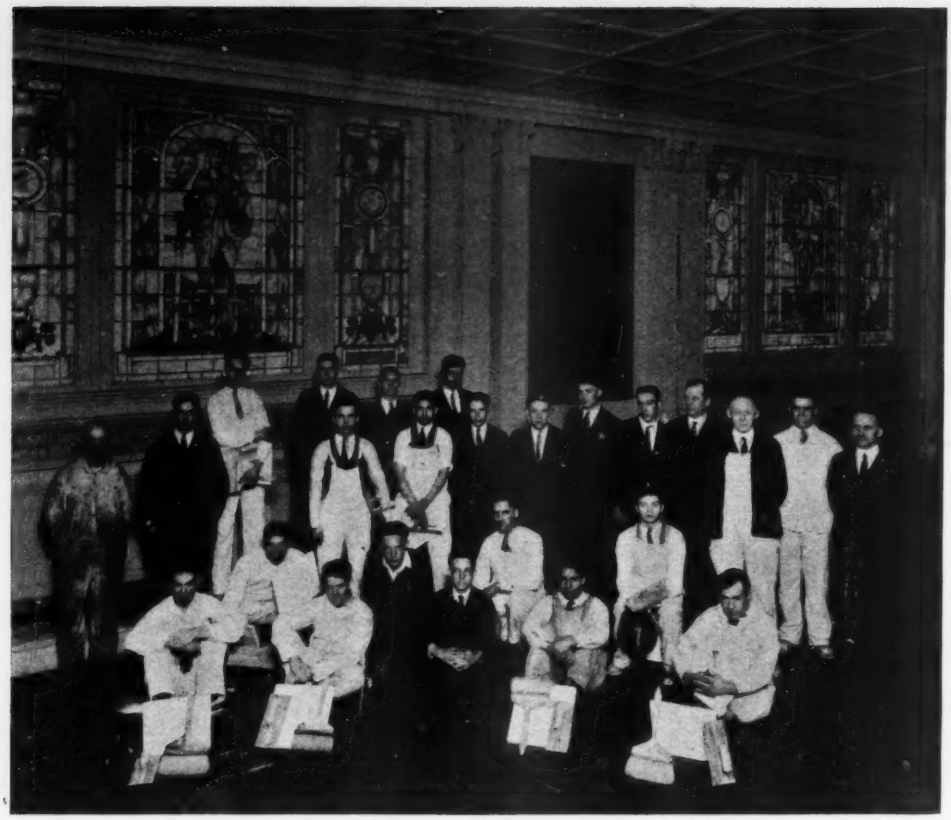
Leonard W. Wahlstrom, Francis W. Parker School, Chicago, Ill.

PHILADELPHIA, "the World's Greatest Workshop." This is the title claimed by its chamber of commerce, and anyone inclined to doubt would be quickly silenced after scanning but half the list of industries and products in which it is supreme—from huge locomotives and monster saws to tiny pins and delicate scientific instruments. Situated within a night's ride of 75 per cent of the industrial population of the United States, Philadelphia lays claim to a higher percentage of skilled workmen than any other community in the country. A fitting place, indeed, for a convention devoted to vocational education.

But Philadelphia has other reasons for preeminence besides its claim to greatness in modern industry. Indelibly associated with the city is the name of Benjamin Franklin (fitting indeed, that the headquarters hotel should bear his name). Franklin was one of the early exponents of a practical education in this country. He served his apprenticeship at a trade. He revered his calling to such an extent that, regardless of the many honors heaped upon him in his later life, he requested the epitaph upon his tombstone to bear the simple legend, "B. Franklin, Printer." What a sermon in this simple statement for vocational teachers, who are concerned with stimulating in their pupils an appreciation of the "dignity of labor"! A visit to the convention would surely include a moment for pause at the shrine of this great man who lies buried within a stone's throw of the meeting place.

Then there is that other shrine, the birthplace of our nation—Independence Hall and the Liberty Bell. No one will fail to make a pilgrimage to this place. Carpenter's Hall, its red brick making a bright spot in the slanting sunbeams filtering down between the surrounding skyscrapers is another link with the colonial past, for here was held the first Continental Congress. The house where Betsy Ross made the first United States Flag is also not for from the headquarters hotel. The old Christ Church, William Penn's house, and Valley Forge are a little farther out from the city and certainly worthy of a visit.

Philadelphia, however, is not only the cradle of our nation politically, but is associated with our educational independence and liberty as well. The Centennial exposition of 1876 will always be associated with the birth of that movement for practical laboratory and shopwork in our engineering schools which was the forerunner of our extensive system of vocational education of today. Philadelphia has always felt the influence of this spirit of freedom in her schools. The



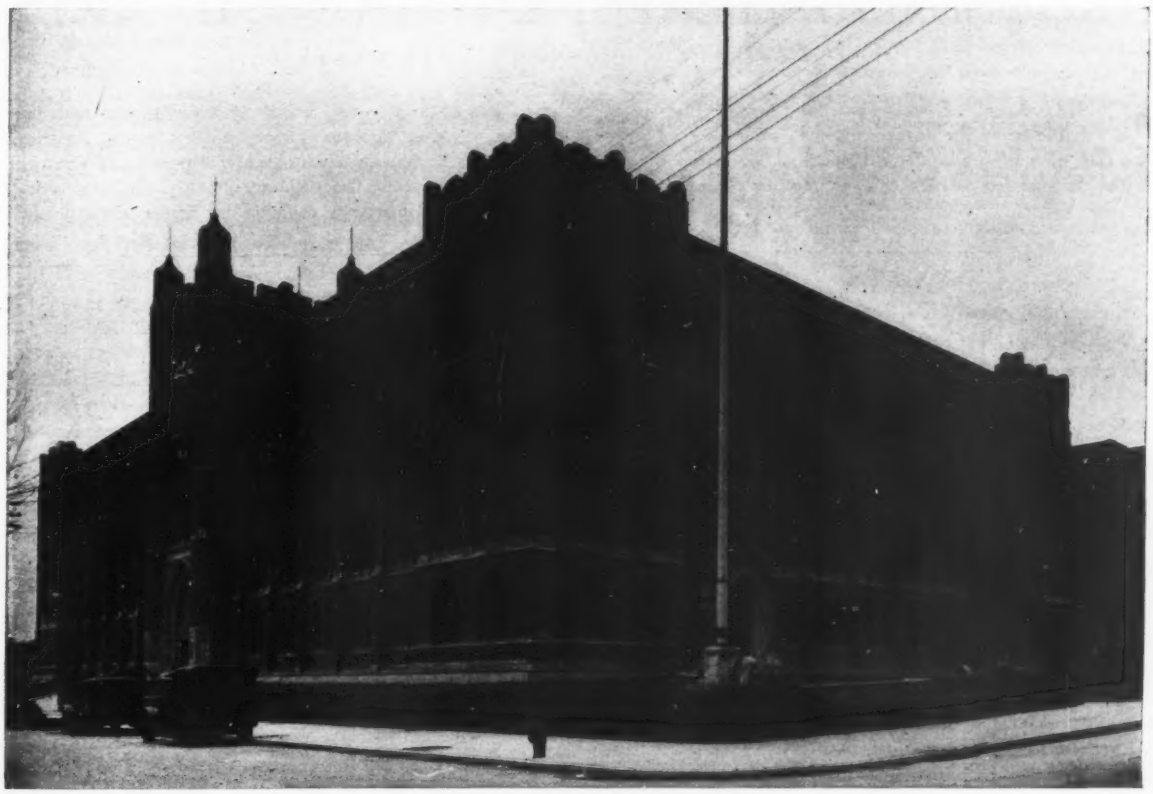
THIS GROUP OF APPRENTICE PLASTERERS CONSTRUCTED THE WAR MEMORIAL SHOWN IN THE BACKGROUND. SATURDAY MORNING CLASSES, SOUTH PHILADELPHIA HIGH SCHOOL

welfare of the common man on the job, which was so much the concern of Benjamin Franklin in colonial days, has persisted in the educational practices in Philadelphia through the succeeding years—even to the present day. No one would doubt this who has stood at the entrance to Temple University and has seen the thousands entering its portals, eagerly striving for an education which the public spirit of an earlier citizen of Philadelphia has made possible for ambitious young people of today. The stimulating of adult education, which has been the subject of careful study by a committee of the American Vocational Association for the past two years has been the mission of the Spring Garden Institute since 1850. This institute is still in vigorous existence with revised and improved courses fully up to the standards of modern practice. Over 41,000 students have received instruction here and the Institute has been the inspiration and furnished assistance in establishing such schools as Drexel Institute, the Williamson Trade School and the Central Manual-Training School. This latter was one of the earliest of the manual-training high schools of the country. The School of Industrial Art was founded in 1877. Girard College is another of the schools to which Philadelphians can point with pride, founded through the generosity of Stephen Girard, one of the city's early merchants. So you see, Philadelphia has its educational shrines as well as those of a historical and political nature.

And now, what of present conditions. The public schools of Philadelphia have established practical-arts education on a sound and continuous basis, from the earliest grades of the elementary school through the junior and senior high schools and into the continuation and part-time trade schools. This is all under the direction of Charles F. Bauder whose official title is Director of Industrial Arts. In his work he has gained the support of over thirty trade organizations and labor unions. This is indeed an enviable record and there can be no question about the soundness of the work with such cooperation. The Girls Trade School, recently established, is coming rapidly to the forefront as one of the leading schools of its kind in the country. The McCall Trade School is adding more trades each year and has done noticeable work in tailoring, paper hanging, and printing. Cooperative work is an established part of the industrial courses of the senior high schools and relations are established with over fifty employers. In evening trade instruction there is an annual enrollment of over 5000 students in upward of twenty different trades and occupations. The school of plumbing is the largest in the country. Mr. Bauder has proceeded in such and unassuming and quiet way in establishing his work that few students of vocational education throughout the country are aware of the high standard which the work in Philadelphia has assumed in this line.

Business, as well as industry, is well developed in the vocational courses of the Philadelphia public schools. Under the direction of John G. Kirk, 325 teachers and over 26,000 students are enrolled in this work in the junior and senior high schools, evening and continuation schools. The splendid courses in retail selling established throughout the high schools, the cooperative work with department stores and specialty shops, and the excellent system of follow-up of the young workers on the job, cannot but produce an intelligent personnel in the city's business houses. Commercial clubs, junior chambers of commerce, junior boards of trade, and interschool commercial contests, make this training full of interest and enthusiasm for the embryo business man or busi-

PHILADELPHIA HAS THE LARGEST TRADE EXTENSION SCHOOL OF PLUMBING IN THE UNITED STATES. A CLASS OF PLUMBING APPRENTICES, SOUTH PHILADELPHIA EVENING HIGH SCHOOL



SIMON GRATZ SENIOR HIGH SCHOOL, PHILADELPHIA, PA.

COOPERATIVE STUDENTS OF MACHINE CONSTRUCTION. WORKING IN THE MACHINE SHOP OF THE D. B. FLOWER CO., PHILADELPHIA

ness woman. It must indeed be a pleasure for the citizens of Philadelphia to do their shopping.

The visitor to the convention will not gain full benefit from his trip unless he has planned to spend some time in a careful study of what has been accomplished in commercial and industrial education under these two men.

Then there are the varied industries for which Philadelphia is noted. The huge Baldwin Locomotive Works should be visited, not only to see these monsters of the rail under construction, but also to study the methods of apprentice training which are there in vogue. Henry Disston and Sons will be interesting to every teacher of woodwork. The shipyards and the League Island Navy Yard will appeal not alone to the visitor from inland, but to everyone interested in a study of this fascinating phase of industry. The Curtis Publishing Company operates one of the largest printing plants in the world, and its chief interest to members of the association lies not in the fact that it publishes the Saturday Evening Post (founded by Benjamin Franklin), but in its training plans for its employees. To mention the many places of interest in commercial and industrial Philadelphia would take more space than is available in this short article. The local committee is preparing a list of trips which will take in every phase of the city's activity and special trips will no doubt be arranged to suit the needs of individuals. A friendly spirit will take in everyone who attends the convention.

Philadelphia is filled with this friendly spirit. The stranger feels it in many ways. Recently I changed cars early in the morning at North Philadelphia from a through train to one bound for the Broad Street station. It was filled with commuters going to work. I found myself asking questions regarding the city from my neighbor. His friendly attitude seemed to invite this. There was no tendency to "high hat" the stranger. The spirit of the gentle Quaker whose figure with the broad-brimmed hat towers aloft from the pinnacle of the city hall seems to cast his benign influence over his city of brotherly love.

What about the program? I find myself at the end of my space with very little said about the program of the association. But with such an able leader as the president of the association, R. L. Cooley of Milwaukee, the success of the program is assured. His epigrammatic statements, clean-cut as a cameo, would alone be worth the trip if none other appeared on the program. But with three days packed full of conferences, departmental sessions and general meetings, who can afford to stay away? The third annual convention of the American Vocational Association will go down in history as the greatest gathering ever held in the interests of vocational education.

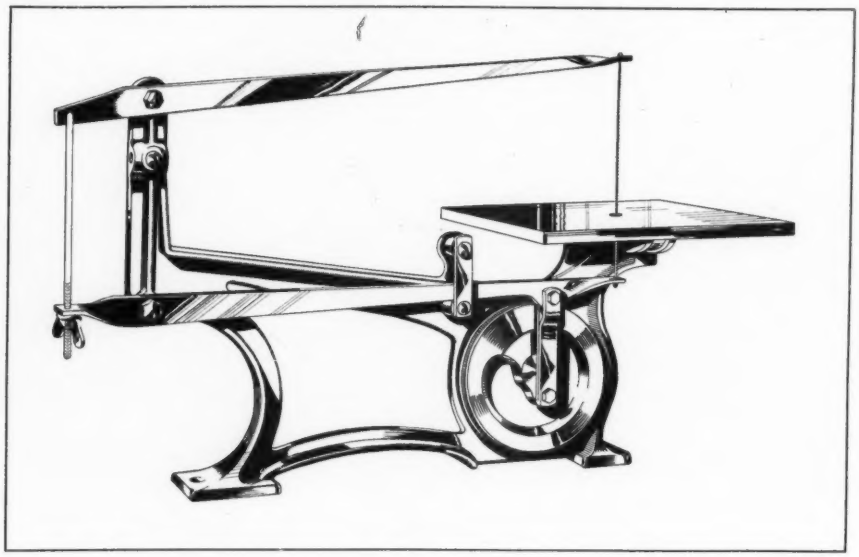
AROUSING INTEREST IN MANUAL ARTS

Geo. D. Henck, Director of Industrial Arts, Pasadena, Calif.

(See Supplements Nos. 117 and 118)

"FINE! Keen! Swell!"—yes, and even "Hot Dog!" characterized the answers given in whole-hearted unison by a class of ninth-grade junior-high-school boys to the question "How do you fellows like this jig saw as a project in this course?"

Those of us who are constantly working with real, live, growing, healthy, vigorous, knock-em-dead, young American boys know that you can obtain such a response only when the boys themselves really *feel* that way about it. It is, of course, possible for an instructor to build up within his individual



JIG SAW DESIGNED BY GEO. D. HENCK, PASADENA, CALIF.

classes and students, a fine spirit of loyalty which will manifest itself in many wholesome ways, but when the interest and enthusiasm of the class as a whole is as unbounded as was evidenced by the above reaction, then something more than the personality of the teacher is responsible for the condition of mind of the pupils.

Interest

Knowing that the problem of teaching is based largely upon psychology, it is evident that a reorganization of teaching material must be made if we are to increase the efficiency of our teaching. The day of the coat hanger, garden stake, whisk-broom holder, and hot-dish stand has gone, though some of the instructors who are still attempting to "teach" through such mediums seem as yet unaware of this. What are boys away from school ordinarily interested in? If you investigate, you will find them watching the two heavy "Mack" trucks, as hitched in tandem, they pull a two-story house up the street. Or, they congregate about the new-type electric shovel as it bites its way into the right-of-way, filling the heavy trucks in four passes. Automobile races interest them. If they are not able to witness them personally, they read the written accounts with avidity. They are able to give you rather accurate data in regard to the different drivers, makes of cars, horse power, fuel consumption, rate of speed, distance traveled, etc. All of this worth-while information is earnestly devoured by the youth of today.

Lindy, in his nonchalant manner, has captivated all—men, women, boys, and girls. Why? What is the psychological basis upon which this interest is founded?

Two automobiles have just met in violent collision. Three people have been killed, several have been injured, and both machines are completely demolished. Why do the boys gather around this wreck? To see those who are dead and injured? Probably, but you notice that they remain long after the victims have been removed. What, then, are the life interests through which the boys lean so much?

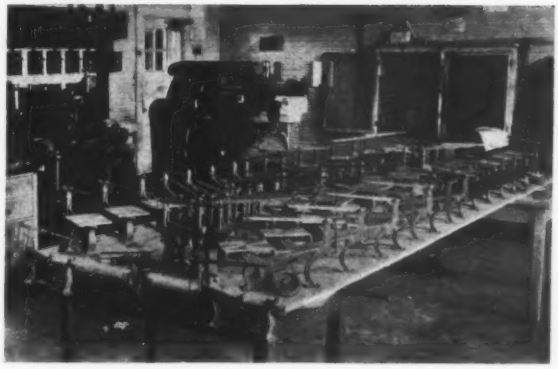
A diagnosis of many actual cases, such as have been described in the foregoing, lead one to believe that the two dominant factors underlying interest in these and similar situations are, first, *power*, and second, *speed*. Which is most interesting to the boys—the jack plane or the power surfacer? The hand ripsaw or the power-driven circular saw? The answer is, "They are interested in those machines which are driven by power and do their work with great speed."

The two terms, "power" and "speed," are really interchangeable—but to interchange them within the industrial fields is one thing—to change the formula within the mathematics class involves a problem of much less magnitude.

Our industrial evolution goes on at a fiercer pace today than ever before. Henry Ford's reorganization of plants and equipment gives us a fair sample of the extent to which this is true. The spray gun supersedes the painter's brush, the motor bus displaces railroads in some sections, and seriously menaces profits in others. The barber uses his power clippers —the hand type being too slow. We are in a hurry and will not wait for antideluvian methods. Enamel requires three days to dry—lacquer, but thirty minutes. Valve grinding, facing, and reseating is now done by power—the hand method was too slow and to inaccurate, and the end is not yet.

If you wish to witness a revolution, try introducing live and worth-while projects in place of the time-worn, hallowed articles and note the results. You will have to hurry out of the way.

In introducing the jig saw shown in Figure 1, and in Supplements 117 and 118, into our junior and senior high



schools as one of the projects to be completed in the machine-shop course, we found it to be well adapted to the use of those instructors who would follow the old order of "processes"—laying out, filing, drilling, tapping, reaming, spindle turning, etc., all on the basis of the "exercise." It worked no less splendidly for those teachers who place emphasis on the matter of "cooperative group effort" in both junior and senior institutions. Such questions as sequence of operation, routing of materials, designing and use of jigs and fixtures, use of control charts, etc., were some of the large questions which the boys were called upon to solve before starting the actual production work. By comparing results obtained through the use of the free-discovery method, the individual and small-group plan, and the cooperative effort plan of teaching, the boys are able to draw very definite and accurate judgments, which will later play an important part in solving the purchasing problem when they are the consumers and judges of materials, labor, quality of workmanship and finish.

Because of its interest-arousing qualities, the jig saw and other similar projects may be used as an entering wedge in the solution of the question "What shall we do to counteract the too-frequent habit of loitering on street corners?" It is possible, through such interest-arousing projects to contribute to the larger aims of education, and at the same time accomplish the production of small power-driven machines—*not toys*—with which the boys can equip their home-hobby shop. Work of this kind, in school and at home, will occupy the time, interest, and effort which might otherwise go to undirected and harmful efforts.

Technical Details

The jig-saw frames are cast iron. We purchase them from local foundries, as we have no furnaces capable of melting iron.

The tables are cast of aluminum, by the eighth- and ninth-grade junior-high-school students.

Because the furnace in one of the schools proved too small to economically cast the 330 saw tables which were required, it was completely rebuilt to increase its capacity. A greater number of larger flasks also were constructed.

All machine work is done by the boys, and where the equipment permits, the work is done on the power grinder, drill press, sensitive drill, lathe, and milling machine. It is possible to construct this machine by using only a bench drill and hand tools.

The jig saw is designed to take regular 6-in. coping-saw blades, or 6½-in. metal-cutting blades. The speed of the machine should be 600 strokes per minute. It takes about $\frac{1}{50}$ horse power to run the saw, and it will cut softwood 2 in. thick. The cost of the parts, including all hardware, is about $2.75.

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

PROVOCATIONAL WORK

A good many years ago when there was a great deal of talk about prevocational work, the Editors of this Magazine proposed a kind of work that could rightfully be called *provocational*, that is, a definite and frank looking forward to vocational work or occupation—an actual piece of vocational education in its elementary form.

With all the changes and experiments and theories that have been tried out since that time, nothing seems to have been discovered or produced that invalidates the claims for such work. Instead of *playing* with some sort of work for a few years previous to the taking up of definite courses in vocational education and calling it prevocational, the Editors of this Magazine claimed, and still claim, that the pupils had better have some actual experiences in an actual shop of actual vocational significance, whatever their purpose or their final choice of occupation might be.

For many years these Editors had been experimenting with the theory as it applied to printing and had been sending out boys into the printing industries and into the business of teaching printing—boys who had found their taste and capacity for such work in the actual productive operations of grade-school printshops.

There is a good deal of sentiment wasted on the boys of the upper-grade and junior-high-school age in the fear that they may learn something or gain some experience or training that may function in later life or at least may set up some guideposts to later training for occupational life. It must not be forgotten that for all the years boys have been leaving school in large numbers at that particular age and have gone, without preparation or guidance, into any possible form of unskilled work.

There is abundant evidence now, that in numerous forms of occupational work, boys and girls in the late grades of the elementary school and in the early years of high school may very profitably engage in such elementary forms of occupational work as will give them a reasonable insight into the beginnings of those occupations, and will give them some basis for a choice of work for later life. There is no reason why such actual forms of work may not meet every requirement of the industrial-arts work for those years. Such work is a long, long step from the tool-process, abstract-joint, sleeve-board, coat-hanger type of work that was in vogue when the term "provocational" was first proposed.

In this very practical day the demand is going to become more and more insistent for forms of work that will supply at least a small measure of education and training that look toward the duties and responsibilities of mature life.

ADMINISTRATION

The job of administration is to get things done as efficiently as possible under existing conditions. To accomplish this, three things are necessary—organization, delegation, and supervision.

Organization should be a cooperative proposition with all the factors affected taken into consideration. It is the general outline without the details. The details should be left to the people doing the actual work.

Delegation is the assignment of the work to be done to people who, in the judgment of the administrator, can carry it out to a successful termination.

Supervision is the periodical checking to see that the main objectives of the program are being accomplished.

This program leaves the actual planning of the details to those who are actively engaged on the job, and leaves the administrator free to plan and think of the main program.

This old formula for successful administration is often forgotten as is evidenced by the prescribed courses of study which have been worked out to the smallest detail; by administrators who spend most of their time hindering progress through strict supervision of minor details; by some who have no independent ideas of organization and are still drifting in the rut into which they dropped when their administrative powers commenced; and by others who insist upon methods which are obsolete and not conducive to the best classroom results.

WHY DON'T MORE MEN TEACH?

A stimulating article by Professor Harlin C. Hines on "Graduating from Grub Street" appears in the October issue of THE AMERICAN SCHOOL BOARD JOURNAL. It is deliberately but constructively critical of the teaching profession, especially as concerns new teachers. It undertakes to point out some of the shortcomings of teachers that tend to drive promising and capable young men away from the profession.

After some very frank discussion of some personal and professional deficiencies, Professor Hines lists five "extra activities" which he summarizes as follows: "Men teachers, if they are to help to keep the right sort of men in teaching, must attend professional conventions, learn to speak and write effectively, learn more about business detail, and keep up with professional study."

Every man teacher should not only feel it his duty to bring to his classes proper preparation, adequate knowledge and a skillful presentation of his subject, but should also feel the responsibility of so handling himself with his students, his social and business acquaintances, and with the general environment in which he finds himself that he will induce other and younger men to follow his example and to be attracted to his calling.

HOW TO RESIST THE SALESMAN

There are courses and lectures and pictures on salesmanship. A great many teachers and institutions seem to be wholly satisfied when they have produced a lot of high-powered salesmen, with the consequence that Americans are now buying a million things they don't need and a million times as much of the things they do need.

We have often been tempted to offer a course in "How to Resist the Salesman." No salesman is really a good salesman who oversells or who creates an artificial sale or market. No sale nor purchase is a good sale or purchase where mutual benefit is not derived from the transaction.

In "resisting the salesman," the prospective buyer must take into careful account his actual needs; must weigh the various means of meeting those needs; must consider the importance of such needs in the light of other pressing needs, assuming that not all his needs can be adequately met; must budget his wants to match his income; must evaluate the situation in the light of his immediate future expectancy; must consider the possible creation of new needs that the meeting of the want in question may bring about; and must finally summon the courage, good sense and self-control to accept the conclusion that the foregoing considerations force upon him.

A knowledge of the nature and quality of goods, their normal life under normal usage, the adequacy with which they meet certain needs without other aid, and the timeliness of the

purchase in terms of season, style, etc., will aid materially in the task of "resisting the salesman."

In other words, Americans, instead of remaining *price buyers* as they now are, need very sorely to be educated in *quality buying,* in the appropriate meeting of stated needs, instead of having to "shop with Suzanne," or being imposed upon by the overanxious commission salesman.

By all means, let's have good salesmen, that is, salesmen competent and willing to help the customer meet his actual needs in the best possible way with the least expenditure of money. But above all, let's have intelligent and trained purchasers who know values and who need salesmen only as demonstrators and exhibitors of the wares they wish to purchase.

The time-worn story, therefore, of the instruction of the old merchant to the new clerk that good salesmanship consisted in selling a customer what he doesn't want, is all wrong. Good salesmanship consists in selling the customer the best possible goods for the least money to meet the wants which the customer signifies. It is a reasonable number of satisfied customers who return again and again that makes a good business instead of a multitude of one-purchase customers.

—⁘—

HOME PROJECT WORK

A great deal has been accomplished by the agricultural and home-economics teachers in getting their work carried over into home projects. These are, of course, largely suitable for such purposes to the rural communities.

It would be a great thing if the teachers of the various shop subjects could bring about such a carry-over of their work into the homes. The modern home that is causing so much of the trouble of the world would be absolutely revolutionized if industrial activities from the school shops could be established in them.

Perhaps the greatest tragedies to the homes of this country occurred when industrial work went out of them. The trouble with the modern boys and girls is that there is nothing of significance for them to do at home. Modern invention and discovery have left many women and most children in the urban centers of the country without anything to do at home.

No greater blessing could come to present-day city boys and girls than to get them so enthusiastic over their industrial activities in the schools that they would carry on some of such activities in their homes.

Art teachers have sometimes inspired their pupils to undertake independent effort at home. Occasionally a commercial teacher arouses an interest that often induces students to purchase typewriters for homework and practice. There are a number of industrial activities in which teachers may arouse home interests. No greater thing could be done for the average boy.

—⁘—

SOMETHING TO THINK ABOUT

In the face of present-day tendencies of encouraging student self-activity, teachers often go to extremes in certain directions without thinking about the consequences. The following article, therefore, is timely and contains a great deal that should be carefully considered before making use of the student self-activity discussed therein. It appeared in the September, 1928, issue of the Educational Bulletin published by the Department of Public Instruction, Trenton, N. J.

"The attention of the department has been called to the rather common practice of having pupils write to industries, to chambers of commerce, and to public officials, for information to help them in their schoolwork. There is no doubt that valuable motivation exists in encouraging pupils to secure first-hand information for use in such subjects as geography, science, civics, and the like.

"Sometimes contradictions of fact have occurred in different textbooks which can only be solved by addressing letters to responsible officials. Certain dangers, however, exist in this practice—dangers which can be avoided without destroying the value of such letters. Quite frequently, for example, all of the pupils of a class will write letters to a single person. It would seem that equal value could be derived from such a project by having the best letter of a class sent, instead of a letter from each individual child. It is obviously impossible for an official in a factory or in public business to answer each child's letter, whereas such an official would be happy to write to a single child in a given class or school. An opportunity exists here to teach children to conserve the time of public officials by not addressing to them letters which are unnecessary, or letters on subjects which they might be able to hunt up themselves.

"Several instances have been reported to the state department of general letters, asking for information concerning items which children ought to be able to find in their own books, in encyclopedias, or in the public library. Quite frequently there would be more educational value in having pupils make these researches for themselves than in simply writing a letter and receiving the information from an older person.

"As a rule, officials in industries and in public office, are very glad to furnish information when it is obvious that such information is of an educational nature and if the request is a responsible one.

"This article is not designed to discourage all such requests, but to point out that they should be carefully supervised and that dangers of misuse of this practice exist."

In connection with the foregoing, other abuses might be mentioned. Business men are not anxious to send costly samples to irresponsible children, because it is a well-known fact that children collect for the mere sake of collecting. These same manufacturers object to sending out catalogs that have cost a considerable sum of money to produce to school teachers, unless they know that there is at least some remote possibility of making sales.

One dealer who issued a particularly fine catalog of expensive furniture, stated that the only thing that he ever got out of a catalog which he sent to a teacher was the compliment of seeing his wares copied in that teacher's school shop.

The teacher himself, therefore, also must avoid the rather common practice of writing promiscuously for catalogs for fear that he and his profession will be classed with irresponsible children or with those who can be accused of dishonorable practices.

—⁘—

Something of the joy of work and the intrinsic value attached to creative matter, when it is the product of a steadfast devotion to high ideals and high mechanical skill, needs to be guarded and preserved in our day. With the extension of craft work in the Philippines, there should be a message for us in the life and work of our artistic forbearers. The pupil who makes a piece of lace or embroidery, and the boy who produces a basket, a bag or a piece of furniture, will be craft workers in the measure that they are actuated by inspiring traditions of the past. To produce a quantity of anything is relatively easy, but to have the article bear the mark of the true craftsman means that the head, the hand, and the heart have been associated in its production.

A boy or girl who does not expect to be a mechanic, is all the better for knowing how to handle common tools—to mend a school bench, make a blackboard, or a set of shelves. But, we feel that the student who can take a regular apprenticeship, or a partial one even, gets most out of the school; and most of its bone and sinew comes up through the shops.—*Southern Workman.*

GETTING A PERSPECTIVE FOR VOCATIONAL GUIDANCE THROUGH THE WORK-PERMIT OFFICE[1]

Czarina J. Giddings, Cleveland, Ohio

GUIDING the young into a suitable lifework is an adventure still so new in education that everyone concerned is sailing on seas that are largely uncharted. The Scylla and Charybdis of individual analysis and unfavorable occupational conditions have frightened many practical-minded persons, and they have declared the whole attempt visionary and impossible. The analysis of the individual, they say, is superficial and uncertain at best, and if the ideal of helping all young people to develop their greatest possibilities were realized, the present occupational world, with its overwhelming number of unskilled and monotonous positions, would not be ready to receive them.

Because variously interested persons have seen different angles of this subject of vocational guidance, the effort toward a more effective education has expanded to include much that was undreamed of by Professor Frank Parsons of Boston, in 1908. At the present time, there are some who wish this service defined as individual guidance for *living*, not simply for *earning a living*.

Without thinking in particular of any one of its many subdivisions such as placement, mental measurements, job analysis, educational direction, occupational information, and character development, all of which seem to be in a more or less nebulous state, so far as a standardized working program is concerned, it has been simply assumed in this discussion that there is a general need for more individual attention, as pupils go through the public schools; and with no other promise, this investigation of conditions in the Cleveland school system was undertaken with the hope of discovering some facts which might throw light on the problem and give a proper perspective to this seemingly stupendous task.

Since we have a free compulsory education, founded on the belief that the welfare of our democracy depends on an intelligent citizenry, every child in the community had to be considered.

The place to begin, therefore, was at the first grade, in which most of the children of the city are enrolled, and then to follow them as they passed through the schools and out into the business world.

Figure 1 shows the enrollment according to grades, in the Cleveland Schools, in the fall of 1922.

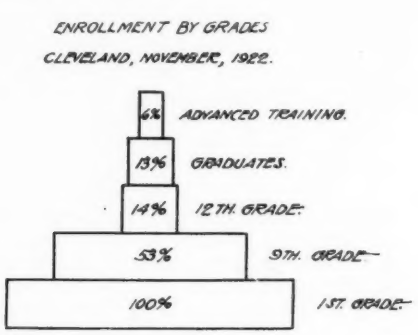


FIG. 1

In other words, the enrollment in Cleveland, in grades one to six inclusive (77,381), is twice the enrollment in grades seven, eight, and nine (28,328), plus grades ten, eleven, and twelve (10,398). The number of twelfth-grade students who were graduated last year, was 2,062. The ninth-grade class this fall numbers 8,474, showing a difference between those leaving and those entering the four-year course, of 6,412, or over 75 per cent. The per cent is not absolutely indicative, for the numbers who entered the ninth grade in the school year 1917-18 should have been taken to show the number in the original group of which the 2,062 were the survivors; but those figures are not available.

However, taking into account the new Bing Law, which requires all boys and girls to remain in school until they are 16 years of age, and various other factors, it is certainly safe to say that over three fourths of Cleveland's children who enroll in the first grade of the elementary school do not enter the tenth grade of the high school. Of the high-school graduates, fewer than 50 per cent continue their education. In other words, less than 6 per cent of those who enter the first grade of the elementary school go to college.

Apparently, the public school is focusing much of its interest and attention on the survivors of the educational system, that is, on the 13 per cent who finish high school and the less than 6 per cent who go on to college. But what of the 87 per cent who drop out? Some will say that everything is being done that can be done.

The schools are offering shopwork, courses in agriculture, commerce, and domestic science, are classifying pupils into rapid, normal, and slow-moving groups, and are offering the academic curriculum in large and small amounts, according to mental capacity.

But in spite of it all, John Smith reaches his sixteenth birthday and is gone, and Mary Brown is down at the "work-permit office" standing in line, while her class teachers are marking her absent for the day; and she is often a full-fledged member of Cleveland's bread winners before her teachers are aware that she has permanently withdrawn from school. Hazel leaves the next day, and Tom the next, and Susie the following Monday; and thus they go, and every day sees a new line of youths at the work-permit office. The 87 per cent who leave school are not missed, because there are plenty of students left

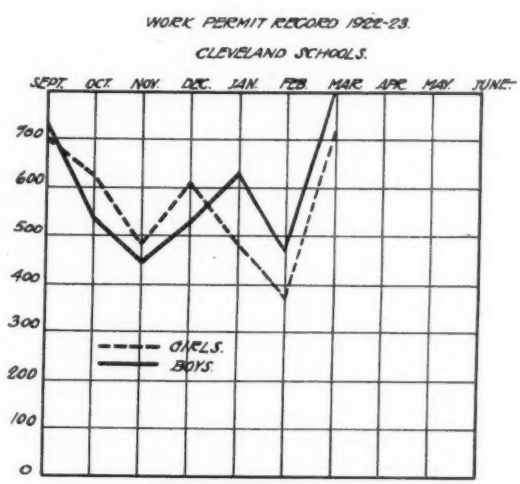


FIG. 2

[1]This article is based on a paper that was read before the Cleveland Educational Research Club several years ago. It contains so much that is good and applicable however, that it is reproduced herewith, even though the study was made in 1922.—Editor's Note.

to crowd the high-school buildings, and effort is centered on those who remain.

Every year, in February and June, the high schools hold commencement exercises for those who complete their courses. These events are of much importance in the community. A glamour seems to hover about the graduate, and orators and poets are inspired to make him the subject of their themes. Every September there is another commencement, also conducted by the board of education, where there are more boys and girls than there were graduated from Cleveland's ten city high schools the preceding June. There are no flowers or music, no pretty gowns or new dark suits, and the event does not receive much newspaper comment. In September, 1922, 1,421 youths of Cleveland received legal permission to work. The event was a drab affair, and no one seemed particularly happy.

The work permits issued in September and October alone (2,599) were more than all the graduates of the 1922 February and June high-school classes (2,062), not counting those who received permits to work after school and Saturdays. Almost two thirds of the permits issued were for the first position. A very few of this number were high-school graduates, who had finished school before their eighteenth birthday.

The Ohio State Law says that boards of education shall be responsible for all youths up to 18 years of age, whether in school or at work. So it was with the purpose of finding the 87 per cent who were lost that the following investigation was made. It was undertaken with as much anxiety as might have been aroused in a ranchman who had but thirteen sheep out of every hundred accounted for, and with as much feeling of responsibility as might have been felt by the manager of an automobile factory who had discovered that 87 per cent of his product was being scrapped somewhere in the process of manufacture. Since the door through which these boys and girls are filing out, one by one, is the work-permit office, it was decided to follow the 1,421 "commencers in industry" of September, 1922, to find out what occupations they were entering —skilled or unskilled; how much specific technical training they had received in the schools; what their employers counted upon, and what their general preparation for industry was.

Figures 3 and 4 show where the 1,421 boys and girls went to work in September, 1922.

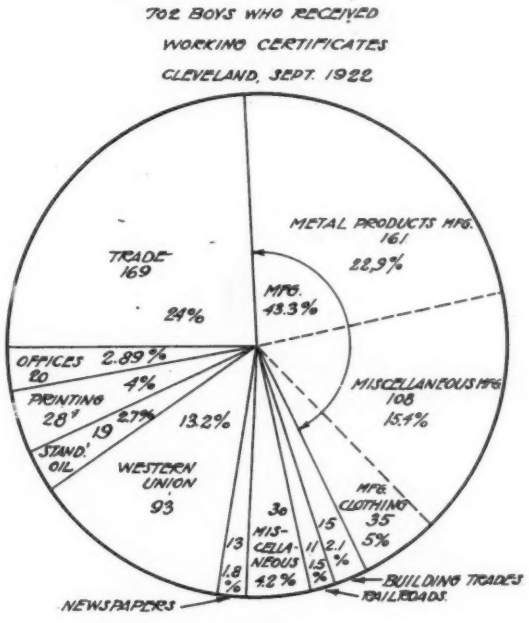


FIG. 3

Figures 5 and 6 show the schools from which the 1,421 youths came who received work permits in Cleveland, September, 1922.

Figures 7 and 8 show the kinds of permits received by the 1,421 Cleveland youths, September, 1922.

Regular permits—16 years of age and through the seventh grade.

Special permits—14 to 16 years, for after school and vacations, regardless of grade completed.

Retarded permits—psychological cases.

Conditional permits—Normal, but not through the seventh grade. (Made exceptions because of financial pressure. There is great difficulty in following these to see that they comply with the agreement to complete the seventh grade in night school.)

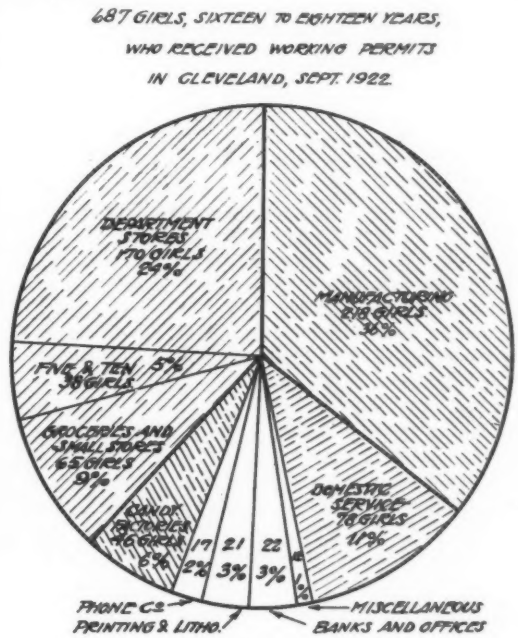


FIG. 4

Figures 9 and 10 show the distribution as to renewals of permits among boys and girls in Cleveland, September, 1922.

One hundred copies of the following letter were sent to the employment managers of the firms employing the 1,421 beginners in industry.

The Employment Manager:

The Department of Attendance and Vocational Guidance of the Board of Education, is making a detailed study of the fourteen hundred and twenty-one boys and girls who received working certificates last September, for the purpose of improving the public schools.

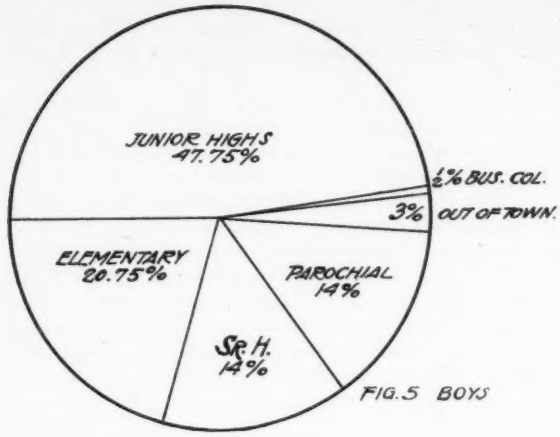
As our charts show that your industry employed some of these young people, will you please favor us by mentioning their most noticeable deficiencies (mental, moral, and physical), and suggesting wherein the schools may improve their training? We have purposely made the question very general, so that you will feel free to mention anything and everything which comes to your mind.

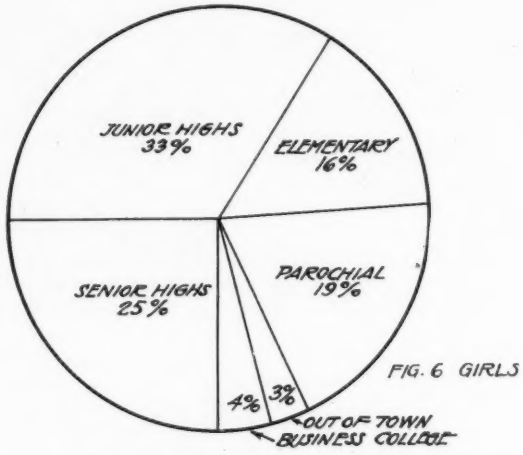
In return for this courtesy, we shall be glad to send you a copy of the full report when it is complete.

Sincerely yours,
(Signed) Czarina J. Giddings,
Assistant Director, Department of Attendance and Vocational Guidance.

In addition, a visit was made to one representative concern in each type of occupation, and the results of the correspondence and conferences were recorded.

It is interesting that the first replies were received from the American Cigar Company, the F. W. Woolworth Com-





FIGS. 5 AND 6 SHOW THE SCHOOLS FROM WHICH THE 1400 CHILDREN CAME WHO RECEIVED WORKING PERMITS IN CLEVELAND, SEPT. 1922

pany, and the May Company. The last named had 5,000 on its payroll in December, 1922, and is the largest single employer of juniors. These companies are well satisfied with the youths sent them. They prefer boys and girls just out of school to the type of adults they get, but that is a doubtful compliment.

Figure 11 shows the approximate mortality in the Cleveland Schools. Figure 12 shows the distribution of adult Clevelanders, as to occupations.

Figures 13 and 14 show distribution of boys and girls receiving work permits as to kinds of employment in Cleveland, September, 1922.

From the general distribution of workers in Cleveland, and the distribution of the 1,421 boys and girls who received work permits in September, 1922, it is evident that the majority of positions in the city are unskilled or semiskilled.

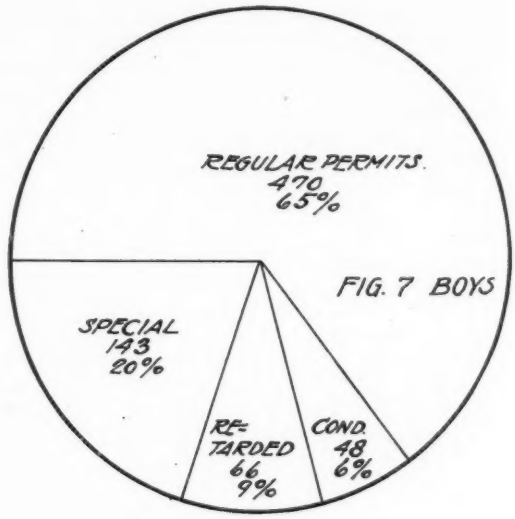
What conclusions may be drawn concerning the 87 per cent who drop out of school, if the 1,421 studied are typical?

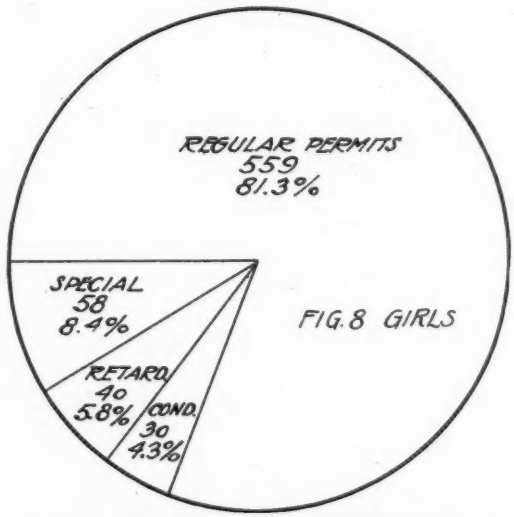
First, there seems to be a relationship between the mortality of the schools and the percentage of adult workers in skilled and unskilled labor, which is verified by the 1,421 cases. From the letters received and visits made, it is evident that each industry teaches its new employees how to perform their particular operations, and with practically no exceptions, those who employ the 87 per cent do not desire, aside from reading, writing, and simple arithmetic, specific training in the youths who come from the schools.

It takes two years of practical experience to become a recognized chocolate dipper. Half of the employees of a department store do not meet the customer, and it is in this group that the junior positions (positions held by youths between 16 and 18 years) are found, such as stock taking, checking, bundle wrapping, and delivering. Each store has a short course of instruction for its particular system. Skill and speed in power-machine operating and loom tending are started in the "vestibule school" of the factory.

Therefore, a second conclusion must be that the specific, technical skill acquired by the 87 per cent who leave school in or before the junior-high grades, is not used. But, without calling it that, employers seem to believe in the doctrine of formal discipline, and are expecting, somehow, that the training received in school will develop desirable qualities and habits. They mention punctuality, regular attendance, thoroughness, common sense, respect for and observance of rules and regulations, courtesy, and ability to take responsibility.

Why should the public schools give more attention to the 87 per cent? They cast over three fourths of the votes at elections; they occupy the majority of seats at the theater; they hold most of the positions in industry and trade; they buy the greater part of the food and clothing; they fill the hospitals; they commit the majority of crimes; they read most of





FIGS. 7 AND 8 SHOW THE KIND OF PERMITS RECEIVED BY 1400 CLEVELAND YOUTH, SEPT. 1922

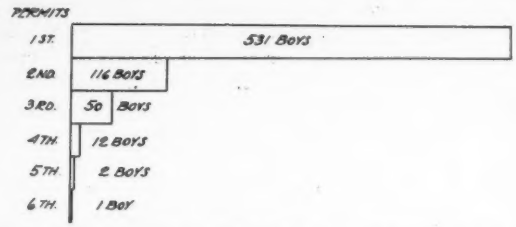


FIG. 9. THIS DIAGRAM SHOWS THE DISTRIBUTION AS TO RENEWALS OF PERMITS AMONG 712 BOYS IN CLEVELAND, SEPT. 1922

the newspapers; they pay most of the rents—in short, they determine the political, commercial, industrial, and social life of the city.

The public schools are sending new workers into this group every day of the year, except Sundays and legal holidays. The majority enter unskilled labor, which must exist in our present industrial and commercial organization. What more can a free, compulsory educational system give the 87 per cent before they are 16 years old, to make their remaining in school valuable to themselves and the community?

In the present occupational world, the average person sleeps eight hours, works eight hours, and lives eight hours. We *think* we are offering an education which trains the youth

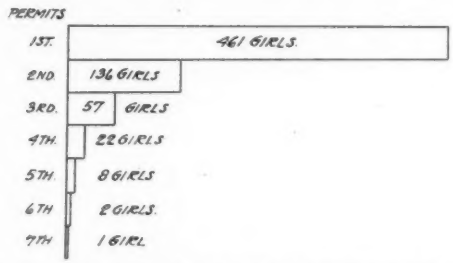


FIG. 10. THIS DIAGRAM SHOWS THE DISTRIBUTION AS TO RENEWALS OF PERMITS AMONG 687 GIRLS IN CLEVELAND, SEPT. 1922

for eight hours of work, but the facts disclosed by the present study show that we are sending over three fourths of our pupils into unskilled labor when they arrive at the age of 16 years, without giving them any recognized technical training.

Schools have so long emphasized mental training that the conservatives in education are still building all of their syllogisms from that premise. Is it not time that we admit our program is wrong, because it is inadequate, and try one which gives at least half the time to another kind of training?

Homemaking and citizenship are not learned entirely through the education of the head nor through the education of the hand. A home is something more than good food and comfortable furnishings, and a good citizen is more than a successful money-maker.

Life insurance companies have computed that of every one hundred men who start out at the age of 25, one will be rich at the age of 65, four will have some income from investments, 5 will still be working on a salary, 36 will be dead, and

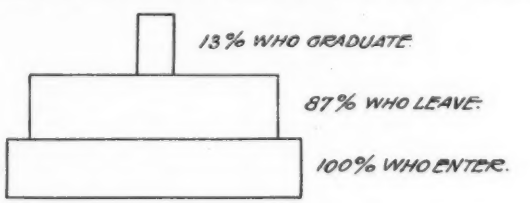


FIG. 11. PUBLIC-SCHOOL MORTALITY, CLEVELAND, 1922

54 will be dependent on relatives or friends. This is a modern way of saying, "A man's life doth not consist in the abundance of the things which he possesseth."

There are several qualities which are the *sine qua non* of every successful life, which should be developed in every pupil. They are the habits of planning, thrift, and success; the proper use of leisure, and the ability to cooperate with others.

In the Cleveland schools an attempt is being made to help every eighth- and twelfth-grade student to make a logical plan for two years ahead; for every individual should know how to plan his time, his work, his expenditures, his leisure. Looking ahead is a very desirable quality. Those who plan ahead are not always thrifty, but thrifty people usually plan ahead. So thrift may be taught as a subdivision of "planning."

Some educators think that the school should make possible the *success* of every pupil, but they say that we are teaching many boys and girls the habit of failure. One can find proofs of it any day in the work-permit offices. If "failure begets failure," then the opposite is equally true: "Nothing succeeds like success."

One industry replied to the writer's circular letter to employment managers, as follows:

"We notice that many young people have not had sufficient stimulation and direction in music, books, art, etc., which so enrich their lives if they keep up such interests after they go to work. That, it seems to us, is something we may fairly expect of the schools."

A vice-president of the American Federation of Labor, in addressing a body of vocational teachers pleaded that our boys and girls should receive at least some education for leisure.

Immigrants who have grown up in Europe have a musical appreciation far beyond the average American. Whom does one find in the museums and galleries on holidays and Sundays? Is it not usually those who grew up under the shadows of the Ufizzi, and other European galleries? Do Americans or foreigners design the garments made in our factories?

There is an instinct which buds and blossoms and comes into full bloom immediately preceding adolescense, and continues through the school age. It is the organizing and joining instinct. It is what covers both lapels of a boy's coat with buttons and badges and pins of every known and many imaginary organizations. We believe this instinct may be used to develop the habit of success, by adjustment to life through contact with individuals, and it may be a solution for the problems of the "time beaters" near the legal working age. For example, one school is successful in a competitive organization in the home rooms which throws the burden of absence and tardiness on the students. The Boys' School of Cleveland,

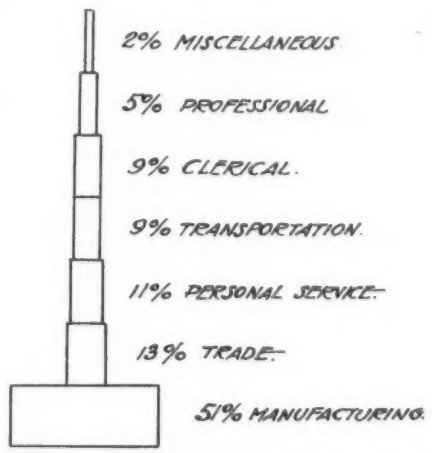
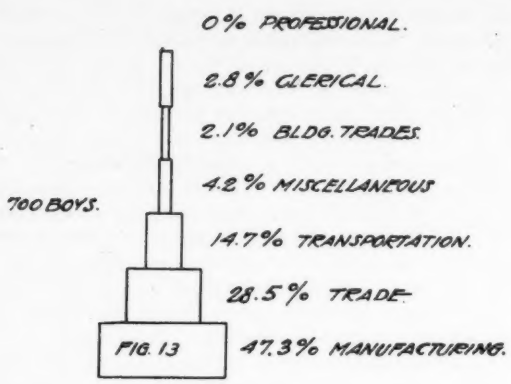
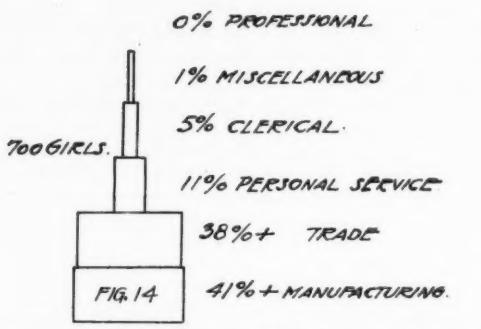


FIG. 12. DISTRIBUTION OF CLEVELANDERS AS TO OCCUPATION. INDUSTRIAL CENSUS, 1922





FIGS. 13 AND 14 SHOW DISTRIBUTION AS TO KINDS OF EMPLOYMENT OF BOYS AND GIRLS, RECEIVING WORK PERMITS, SEPT. 1922

a school for boys who have been misfits in the regular schools, has many organizations which seem to prove the value of this kind of training.

Finally, the last suggestion for helping the 87 per cent is the requiring of a notification period of at least a week from all pupils who are anticipating withdrawal before they can receive an honorable release from school. This gives teachers and advisors some time in which to look into individual cases. At present, many who come to get work permits are leaving merely because of some misunderstanding with a teacher or principal. Often it is possible to make adjustments which returns some of these dissatisfied students to school. Such cases should be settled at school, and not at the work-permit office.

The less than 15 per cent who survive the public educational system mentally and financially and temperamentally, are to be found in the eleventh and twelfth years. They are also in every preceding year, but not readily recognizable. It is necessary therefore to begin a selective process early in the junior high school to determine the aptitudes, ambitions, and financial resources, so that each pupil may be advised accordingly, as to his course of study. Pupils with superior ability but without a family educational precedent, should be encouraged in every way possible to prolong their school life, and conversely, pupils planning beyond their powers should be tactfully dissuaded and directed into lines in which there is a reasonable prospect for their success. There is a serious danger in deciding too definitely a pupil's status, after one mental test. Advisors should never prescribe a course of study which will cut off advanced education, should the pupil's ability and interest take a spurt sometime later. Unless it is a case of decided subnormality, no future should be decided on mental ability alone.

Financial necessity is not the real cause for as many withdrawals as one is often led to believe. Poor mentality is a greater cause, we are told. Yet many able and ambitious boys and girls are forced to leave school because of lack of funds at home. The great field of public-school scholarships is almost untouched. Many believe there should be competitive scholarships open to pupils beyond the compulsory school age and in the upper grades of the high school, so that desirable students may be enabled to complete their courses.

More scholarships are needed for high-school graduates for advanced training. The vocational-guidance department was successful last year in securing ten scholarships for high-school graduates for the Cleveland City Hospital. Similar competitive scholarships could be used to secure opportunities for worth-while students to the Cleveland School of Education, or to other local institutions.

The average age of a high-school graduate is 18, and therefore is not required to go through the work-permit office before he takes his first position. He does not receive the physical examination which the youths who go to work before that age obtain. These examinations often disclose ills which usually can be corrected before they become dangerous.

Last July, the Bell Telephone Company notified the work-permit office that two June graduates from an academic high school had been rejected because they had symptoms of tuberculosis. The girls themselves had no suspicion of their danger. Another girl had a goiter and was running a temperature. She, too, was quite ignorant of her malady.

Of the 25 gifted children whose names were sent from the high schools last year, and who were examined mentally and physically, only three were in very good condition, and the majority did not pass a good physical test except for vision. These cases may not have been indicative as some were of the "book worm" type and had not taken more than the required gymnasium routine. Since good health is the foundation of success, would it not be desirable to give all pupils 18 years and over when they leave school, a physical examination comparable to the one given in the work-permit office?

Certain deductions have been drawn from this discussion concerning the 87 per cent, and a few suggestions have been offered for the 13 per cent. What may be said, in conclusion, for the 100 per cent? If, as someone has said, "The most valuable possessions are 'power to think' and 'love of truth,'" should not the public schools use every available means to develop both of these qualities in every pupil, and thereby secure the welfare and perpetuity of our glorious republic?

BEAUTY CULTURE TRAINING, FRANK WIGGINS TRADE SCHOOL, LOS ANGELES, CALIF.

THE SIGNIFICANCE OF INDUSTRIAL ARTS IN MODERN EDUCATION

John J. Hatch, Director, Department of Industrial Arts, State Normal School, Newark, N. J.

EVEN if there were no educational philosophers, rare and respected as they are, and even if there were no educational theorists, numerous and persistent as they are, the time will probably never come when any definition of the aim and meaning of the educational process will be accepted by all concerned.

This process of education is centuries old and the very fiber and backbone of it, as practiced in the progressive schools of today, is the composite result of the findings of hundreds of educational leaders whose judgments were based on scientific foundations because they had devoted their lives to the betterment of educational practices.

We all know that the Russian System, the Sloyd System, and the Arts-and-Crafts Movement were once a part of this process of education, but at the dawn of the twentieth century they had been relegated to the educational scrap pile and what is now generally called "industrial arts" had arrived. In spite of both its friends and its foes, it is now in a very healthy, active, and growing condition. In some of the past years, "manual training," as it has been called, has been openly attacked, apologized for, neglected, disowned, grievously sinned against, and by a few tremulous souls, placed quietly in its grave and covered over.

During this colorful period of industrial-arts history, we have attempted vocational courses, we have attempted to organize our shops on a factory or a production basis, we have attempted to develop vocational skills, we have attempted to give short-unit trade courses—yes, we have attempted all of these and more, under the guise of industrial arts. A sane analysis of results shows absolute failure to attain, to any appreciable degree, these desirable ends.

Today, the objectives of industrial-arts and vocational courses have been rather definitely established but there still remains much misunderstanding in the minds of some supervisors and teachers regarding the real purposes and values attached to each.

Vocational education, let it be emphatically said, is a crying necessity and is for certain well-defined groups, neither better nor worse than other groups; simply defined by certain attitudes and aptitudes, vocational desires, and economic conditions.

Industrial-arts teachers need feel under no compulsion to call their work vocational or to try and teach vocational courses for which they are not prepared, for which they have no adequate equipment, and for which there may be really no need nor demand. Let's quit trying to make industrial arts what it is not and shouldn't be; let's cease to apologize because it is not something else. It has a big, clear, undisputed field awaiting our sane cultivation. And in some localities if we must, let's sell the industrial-arts idea to the people, let's convince the public outside the schools that industrial arts for an industrial people is not a luxury, nor a tag-end subject, in the school curriculum, but an economic necessity. Let every teacher worthy of the name come forth from his workshop and drafting room and become a real optimistic propogandist for the cause. Let him do his share to enlighten the public, through the press, through discussions, through parent and teacher organizations, and above all, through continued demonstrations of practical work in his own local school system.

In view of the fact that considerable misunderstanding still prevails among teachers and administrators in the respective fields of industrial-arts and vocational education, as to the specific service each is supposed to render, it may not be amiss to state the primary aims of each.

Education may be divided into two great divisions; education for culture, and education for vocation. The dominant idea in one is *appreciation* and in the other, *service.*

Vocational education has been placed in our schools to develop vocational efficiency and to strengthen the civic and vocational intelligence, while industrial arts can only justify its position on the side of general education. Undoubtedly, if a vote were possible from all industrial-arts teachers throughout the country, it would be found that 95 per cent of them are not trying to turn out mechanics. Industrial arts has been, is, and should continue to be, a very definite and important part of the general educational process. Its chief objective should be to develop appreciation—an appreciation of a hand and machine-made world, an appreciation of the functions of tools and machines and the problems connected therewith, an appreciation of materials and mediums for definite purposes, an appreciation of systematized jobs finished in a businesslike way, appreciation of accuracy, of skill, of ability to think straight, of industry, and of dependability in the whole field of industrial activities.

Teachers of the industrial arts should look upon their work as a vital part of the foundation upon which can be reared a more sightly and attractive superstructure to be known as vocational training.

The foundation, in New York City in 1907, of the National Society for the Promotion of Industrial Education was destined to have a far-reaching effect on industrial arts in this country. In its early propaganda work, many of its members seemed to think that it was necessary to thoroughly discredit manual training in the eyes of the American public. These attacks, coming from powerful sources discouraged many of the younger teachers and caused a number of superintendents to consider the discontinuance of manual-training courses in their respective school systems. Regrettable as this propaganda was at the time, nevertheless it created an acute condition which served as the greatest boom ever given the industrial-arts movement. It called to the defense of this work, many strong advocates and produced what proved to be a most healthy country-wide discussion. Teachers were led to reexamine the subject and to restate the values and aims in no uncertain terms. In due course of time it was completely proved that industrial arts had profited by all the earlier movements and was a more valuable part of our school program than it had ever been before. While advocating its purposes in general education, it was no longer under the necessity of trying to show specific vocational values, and, therefore, was able to clearly reaffirm its true objectives and state them in terms of a sound educational philosophy. Because of the efforts of the advocates of vocational education to show what industrial arts is not, it has been able to show more convincingly than ever before what it really is.

Today, it stands as a vitally important part of American education, strongly appealing to the boys and girls in the school as no other subject does, appealing to their inventive and constructive instincts and interpreting for them the industrial life of the nation. As proof of this statement, one need but note the constant expansion of this type of work and a rapid development of the whole range of ideas for which it has always stood. Up to the present minute, vocational education not

only has not injured industrial arts but has greatly advanced it. It is safe to assert that never before has this whole field had so firm a place in the schools as now.

Every revision of the traditional school curriculum that has been advocated during the past ten years by the leading exponents of education has embodied more of the industrial-art activities rather than less. The junior-high-school movement, the platoon system, the duplex plan, the alternating plan, the intensive plan, the work-study-play schools and many other adjustments in school administration in the foremost cities of the country have provided more time for this type of instruction. This fact is significant and surely indicates that industrial arts has, through its own merits, won a most important place in the curriculum of today.

These various methods of organization in the elementary schools are being welcomed by the progressive teacher of industrial arts because they place his subject on the same basis as the others of the curriculum and give him a chance to utilize industrial arts in the elementary and junior schools to somewhere near their full value.

The men who have labored long in the field of manual training are more or less agreed that the subject is, and should be, predominantly cultural up to the seventh grade—at this point, opinion seems to be divided. It would seem that by enriching our courses in the seventh, eighth, and ninth grades by the introduction of several other mediums as well as wood, either by the much approved diversified shop plan so splendidly organized in many cities or by installing a number of shops for the teaching of electric work, sheet-metal work, printing, etc., as now organized in many junior high schools, we would still be within the realms of cultural work and yet have given the pupils much general information of various industries.

Undoubtedly the only way that real worth will come to such school organization is first, to incorporate sane courses of study in industrial arts, and second, to place such courses in the hands of trained teachers who have the vision and who have more than a union card in some industrial pursuit as a credential for a license to teach boys.

However, after all has been said and done as to what constitutes a real course in industrial arts, we cannot expect beneficial results unless we, as teachers and administrators, standardize our aims and objectives and see to it that only that type of work which fully conforms to such purposes has a place in the schools.

What is our big aim? It cannot be considered essentially new nor does it exclude the older psychological considerations which include such things as "correct habits of thinking," "formation of judgments," or even "disciplinary values," and "the training of the mind through the hand." May we not state our big aim as the development of industrial intelligence? This in turn entails giving students such a variety of experiences with various tools and materials, fundamental industrial facts and related information, that these will lead to proper judgments and self-expression later, as well as leave a desirable residue of technical skill. This precludes, in a great measure, the old "wooden" ideas of imitation, including the "models" such as the coat hanger, pencil tray, and flowerpot stand; rather does it substitute creative conception and initiative, combined with a fair amount of skill and a desire to do real things in our economic and industrial life.

Under these circumstances we might well include simple sheet-metal work, electric problems, cement work, printing, pipe fitting, and household mechanics. These are all activities quite within the range of boys' ability; nor should we eliminate cabinetmaking, forge work, gas-engine practice, and machine-shop work. It might well be added, that unless teachers properly trained and with broad vision of the entire industrial-arts field are placed in charge of such programs of administration, the work will come to naught. Many teachers, and this is said in a spirit of helpfullness, woefully neglect the information side of all shop activities. Many a problem that may be completed in two or three hours, has perhaps two or three weeks' study in history, commercial geography, science, or what not, connected with it. Unfortunately, this phase of the work is too often left undone. Can't every shop and workroom have an abundant supply of charts, graphs, catalogs, pictures, exhibits, and other teaching aids that will awaken the curiosity of boys and girls and can't we teachers spend just a little more time in real teaching and perhaps just a little less in patrolling the aisles between the benches and work tables dictating commands that make it unnecessary for the students to do much real thinking?

And then let us all think that industrial arts is just entering its most fruitful and promising stage. That it is just breaking away from the rigidity and inflexibility that so long impeded its progress. That the next ten years will witness a wonderful development in the content of its courses and that we, who hold the reins of responsibility for it, will push right ahead with great vigor in developing new lines of work, enriching the old courses, vitalizing their methods, and putting such intent into the work as will command and hold the respect of the educational world.

And then let us firmly believe that the arts in all their forms, the industrial education, the vocational courses, the part-time and continuation schools are here to stay. They are meeting, perhaps imperfectly, but nevertheless surely, some very great needs in our educational system and in our social and industrial life. The American people realize this fact and they will continue to pay the price as long as the work progresses and provides intelligently for the practical and aesthetic training of their boys and girls.

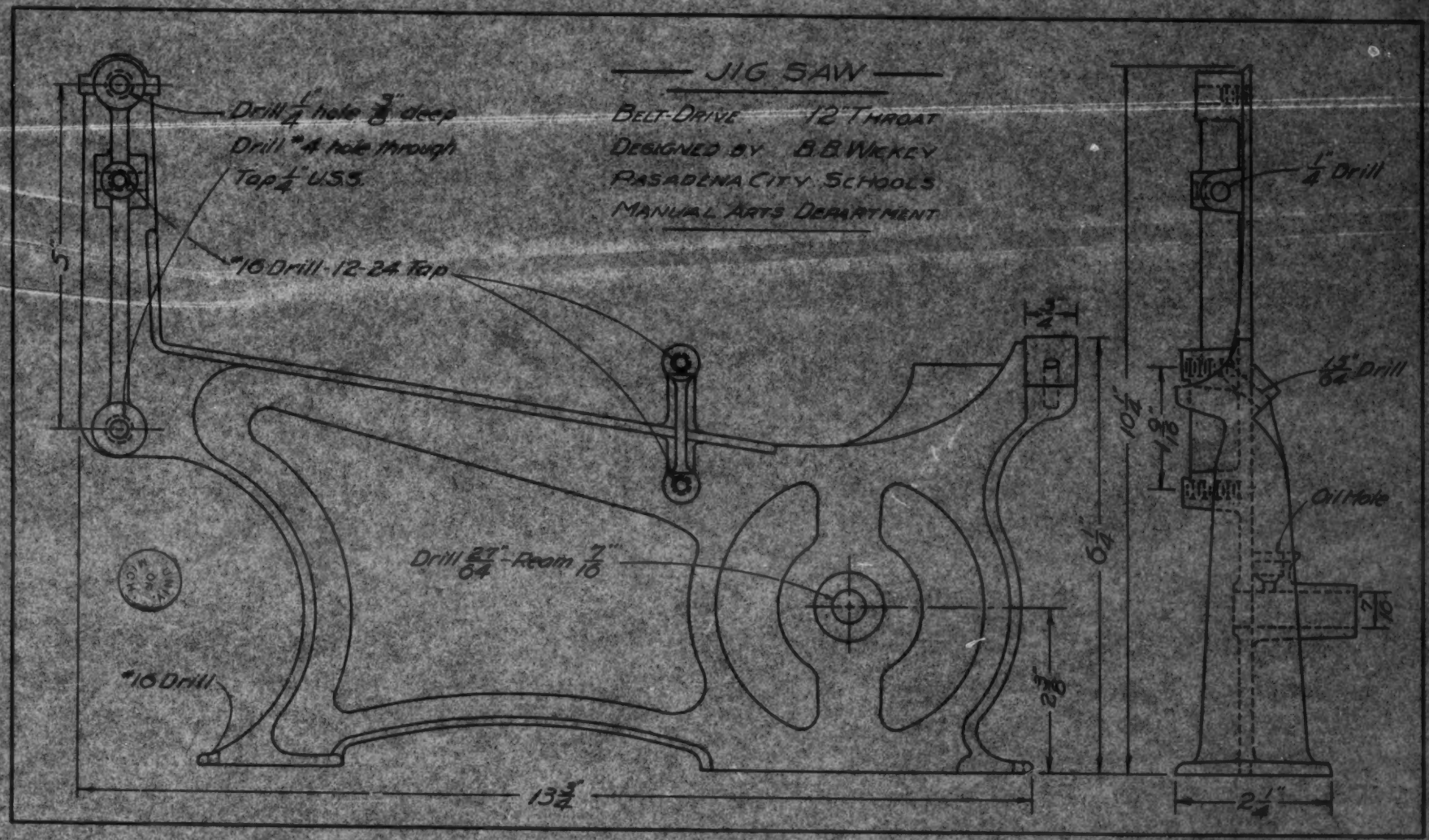
In conclusion, the following quotation (author unknown) seems appropriate:

"I have long dreamed a dream. I have envisioned a school where the boy is king and the teacher a prince. I see a school where boyish ambitions are valued. I see teachers who take the advice of boys and boys who seek the advice of teachers. I do not see many shops in this school with brand new equipment costing $50,000 which is kept spotlessly clean and new. I do see a few machines of varied type and each one with a schedule of work taxing it to its limit. I do not see a class of twenty boys making twenty taborets but a class of twenty youths doing twenty different things. One is making a taboret because that is the height of his ambition and so he is just as happy as the lad who has just tuned out 'Frisco and is now trying to get the Fiji Islands, or the fellow who has just put the last daub of bright red paint on his rejuvenated flivver. I see the boy who is sweating at the forge hammering out a crankshaft for an outboard motor. As he hammers and sweats, barely seeing the glowing steel, just that amount of his mind required, is on the process; the rest of him is far, far away on the glistening bosom of some silver lake. There comes a cough, a hiss and then a steady purr, and he is away. Perchance a bobbed head may appear dimly outlined in the prow of the boat or perchance a Skinner No. 2 spoon hook be dropped off to troll in the wake to entice the wary pike. Who knows, who cares, except to know that youth—glorious, invincible youth—is being served?"

THE NATION'S JOB

It goes without saying that, as long as Americans insist, as they do, upon regarding education as the one and only solvent of the problems of civilization in our country, a very prominent place should be accorded to education in industrial art, and this industrial-art education linked with industrial-art production. But, this national need should not be left to institutions and individuals, to the trade and to the educators alone. It is a national job that requires national attention and action.—*Leslie W. Miller.*

To be Mimeographed for School Shop Use Only
© 1928, The Bruce Publishing Co.

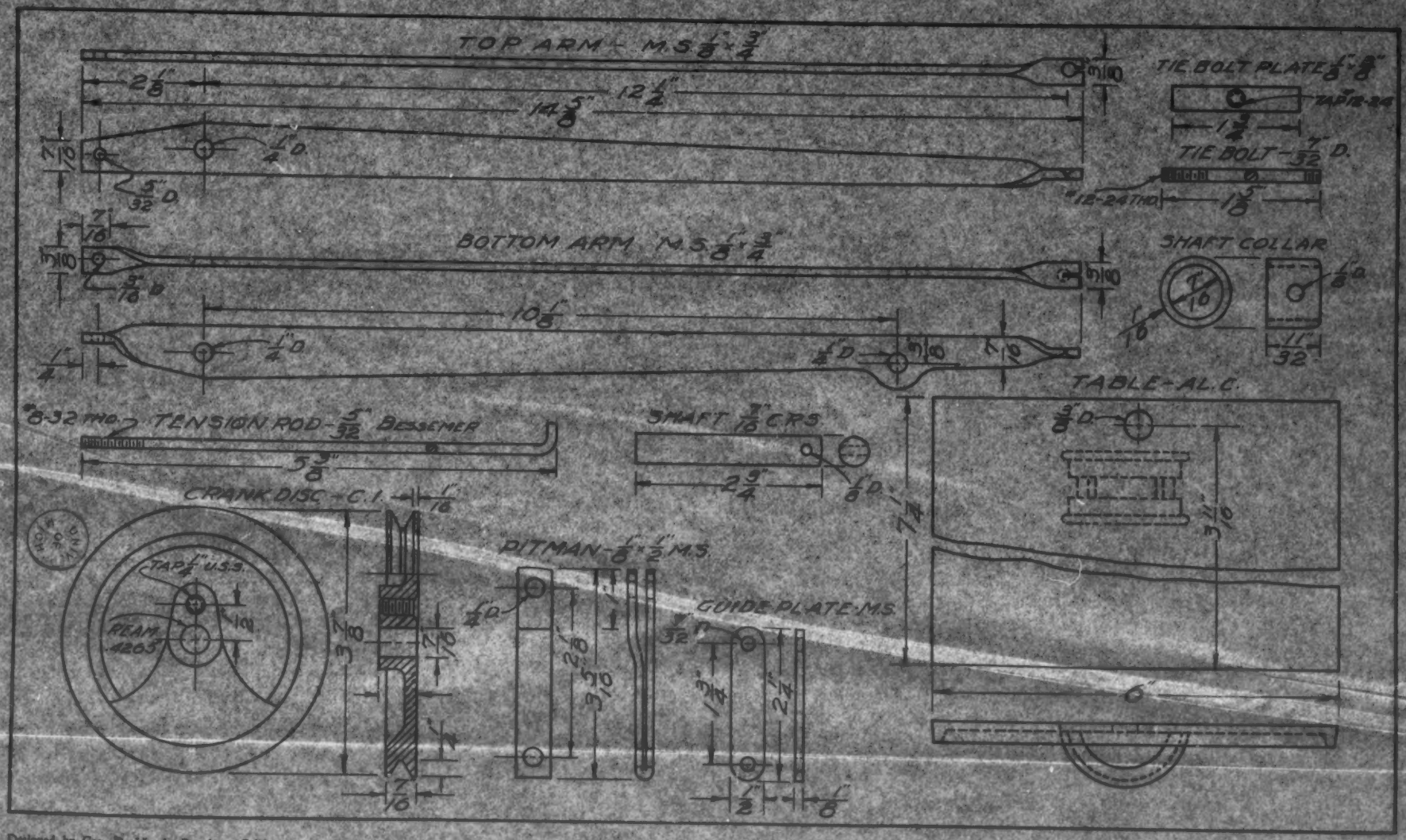


Designed by Geo. D. Hauck, Pasadena, Calif.

For Description See Page 432, Industrial Arts Magazine, December, 1928.

TRACING SUPPLEMENT No. 118
THE INDUSTRIAL-ARTS MAGAZINE,
DECEMBER, 1928

To be Reprinted for School Shop Use Only
© 1928, The Bruce Publishing Co.



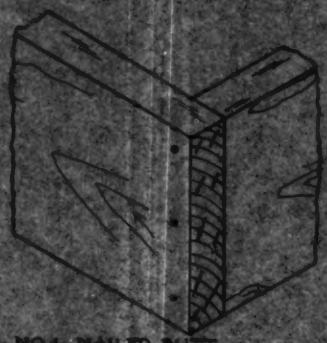
Designed by Geo. D. Hinck, Pasadena, Calif.

For Description See Page 432, Industrial-Arts Magazine, December, 1928.

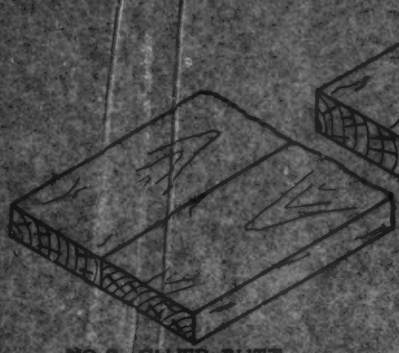
TRACING SUPPLEMENT No. 119.
THE INDUSTRIAL-ARTS MAGAZINE,
DECEMBER, 1928

To be Manifolded for School Shop Use Only
© 1928, The Bruce Publishing Co.

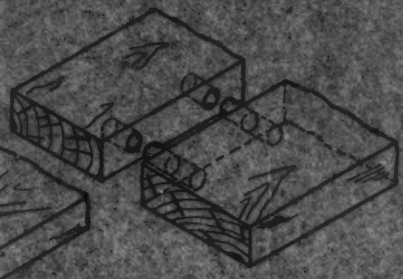
— ELEMENTARY WOODWORKING JOINTS —



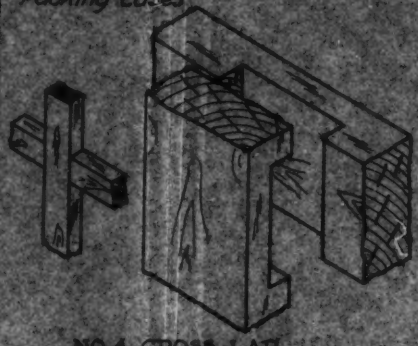
NO. 1- NAILED BUTT
Small boxes, cases, Flower boxes, Packing cases



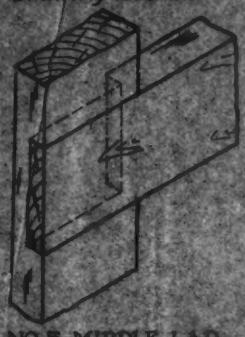
NO. 2- GLUED BUTT
Table and taboret tops, Drawing boards



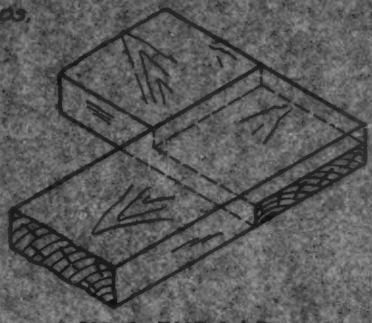
NO. 3- DOWELED BUTT
Same as No. 2 Joint much stronger



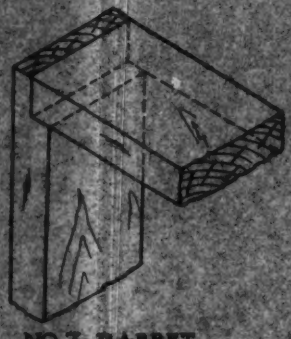
NO. 4- CROSS LAP
Taborets, Plant stands, Hall trees



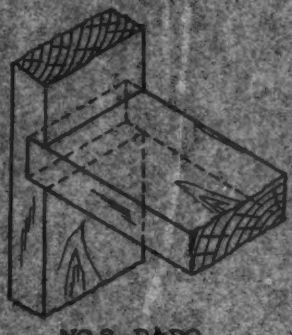
NO. 5- MIDDLE LAP
Used sometimes where boy's ability does not warrant No. 6 or No. 7



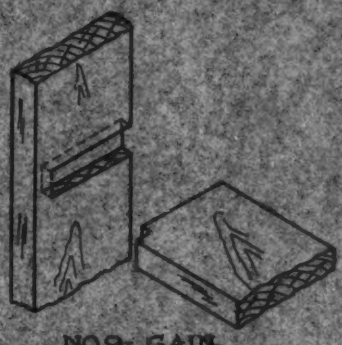
NO. 6- END LAP
Same as No. 5



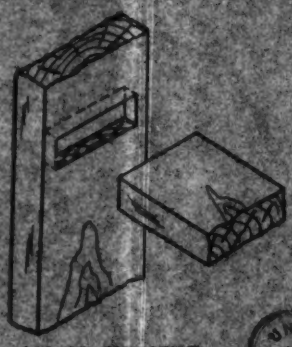
NO. 7- RABBET
Simple drawer construction



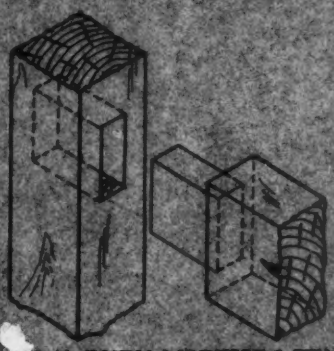
NO. 8- DADO
Drawer construction sides and back



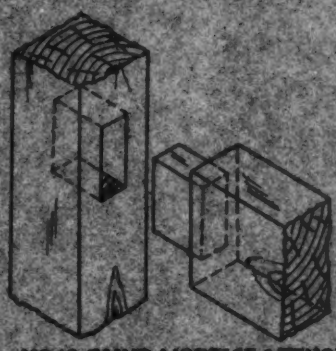
NO. 9- GAIN
Shelving in bookcases



NO. 10- HOUSED
Book racks



NO. 11- THRU MORTISE & TENON
Tables, Stools, Taborets



NO. 12- BLIND MORTISE & TENON
Same as No. 11

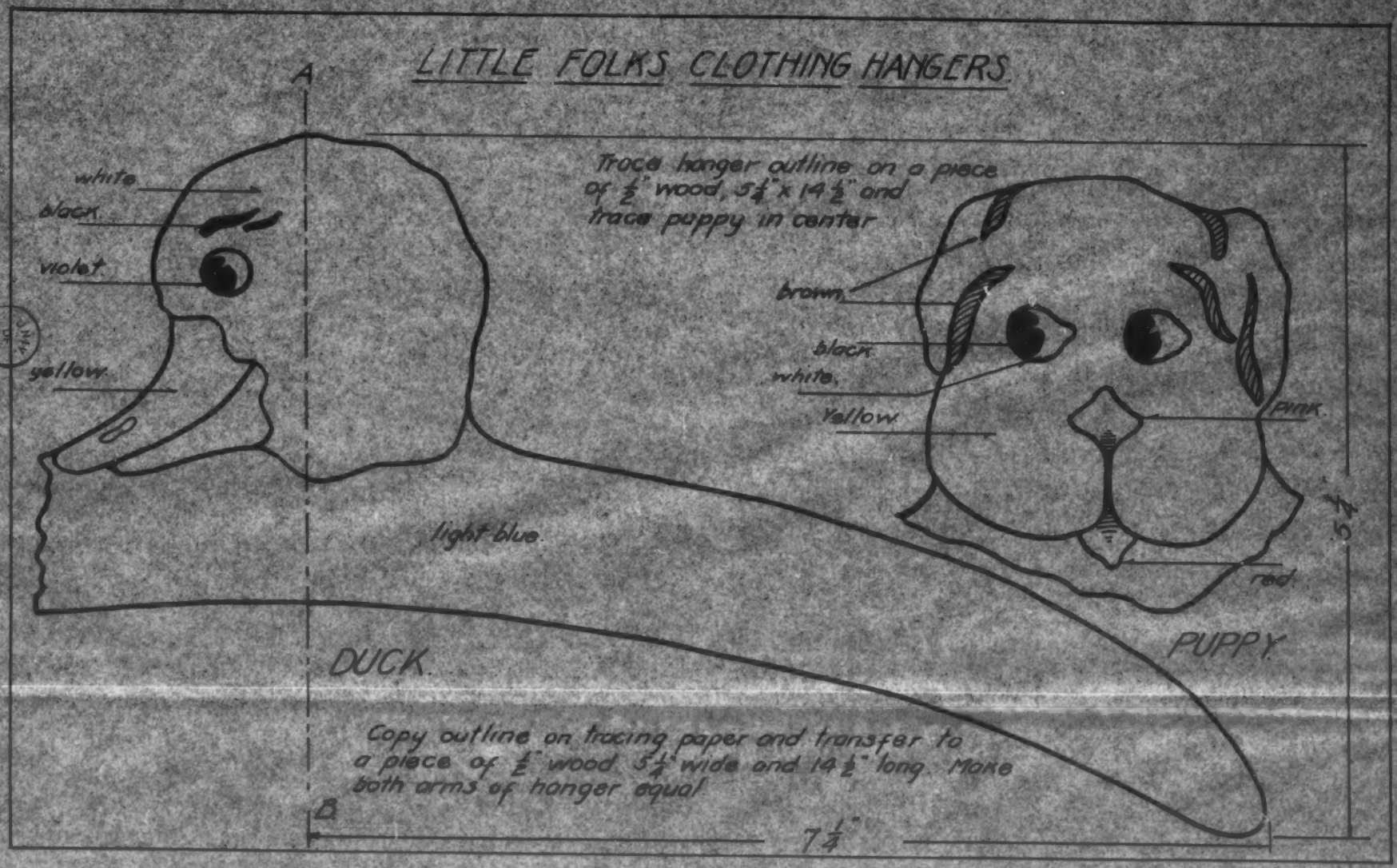
Designed by John F. Faber and Jonathan Bolgar, Erie, Pa.

For Description See Page 444, Industrial-Arts Magazine, December, 1928.

TRACING SUPPLEMENT No. 116
THE INDUSTRIAL-ARTS MAGAZINE
DECEMBER, 1928

© 1928, The Bruce Publishing Co.
To be Reproduced for School Shop Use Only

LITTLE FOLKS CLOTHING HANGERS



Copy outline on tracing paper and transfer to a piece of ½" wood 5¼" wide and 14½" long. Make both arms of hanger equal

Designed by Lena H. Bentz, Hudson, Ohio.

For Description See Page 444, Industrial-Arts Magazine, December, 1928.

WHAT THE STUDENT EXPECTS FROM THE INDUSTRIAL-ARTS INSTRUCTOR

Kenneth R. LaVoy, William Nottingham Junior High School, Syracuse, N. Y.

THE student has a right to expect certain things from his instructor in industrial arts. Too often we think only of what we expect, and regard the student merely as a means to accomplish aims or objectives. As the real product of our work is not bookracks nor tables, but trained boys, we should consider only the ultimate value of our work to them. The following is a résumé of numerous answers received from the students themselves on this question:

We expect the instructor to be a man among men; a man whom we can respect and obey as a leader.

We expect him to understand our individual differences, and we feel that he should not try to mold us all to the same pattern, for we are intensely individual and yearn to be treated as individuals.

We expect him to have a sympathetic attitude toward our youthful ambitions, a word of praise for work earnestly accomplished, and a willing hand in helping us overcome the difficulties which we encounter. We expect also that he will not require the perfection from our hands that would be demanded from those whose skill has been developed by years of practice.

In our transgression of rules, we expect that his attitude will be impartial and just, and not harsh and uncompromising. We want him to see that youthful restlessness and undefined longings influence our attitudes and that encouragement and understanding will help us to solve the complexities of our active young lives.

We expect that he will foster a spirit of cooperation throughout his shop, and that the shop itself will be cheerful, orderly, well lighted, filled with fresh air and kept at a temperature which will permit us to do our best work. We do not wish to be treated as individuals who are retained against their wills, but rather as trusted workers who are able and willing to shoulder responsibility.

We want to taste the joy that comes with achievement, and we, therefore, expect that the work that is given us be suited to our abilities. We want to experiment and test our aptitudes for various types of work. We want to make things that interest us, for we cannot do our best on projects that have no appeal to us. We expect also, that the work which is given us, is arranged according to the fundamental processes of learning, and that the method of instruction is based on sound educational practices. We further expect that our instructor has a definite objective for each piece of work that he gives us so that our time and efforts will not be wasted on a needless routine or on repetitions.

We often feel a restless urge to be doing something, and frequently we do not know the "why" of our actions. We, therefore, expect our instructor to be conversant with psychology, so that he can help us to acquire the right habits of behavior and teach us self-control.

We expect great things of our instructor. He must not only be a skillful craftsman but a wise counselor and a master teacher, because he has the opportunity of exerting a vast influence on our future lives and we feel that it is our right to expect that such influence will be of the very best.

FOR THE CABINETMAKER'S NOTEBOOK

W. G. Hjerstedt, Roosevelt High School, Chicago, Illinois

CHIPPENDALE FURNITURE CHARACTERISTICS. (1) C and S scrolls. (2) Cabriole and square legs. (3) Ball and claw-foot. (4) Lattice and fretwork. (5) Original forms and adopted decorations. (6) Serpentine and swelled fronts. (7) Rococo decoration. (8) Stable construction. (9) Varied forms and decoration. (10) Chinese, English, French, and Gothic designs. (11) Used satinwood profusely as early as 1765. (12) Mahogany was the principal wood used.

CHIPPENDALE FURNITURE—ORNAMENT CHARACTERISTICS. (1) Acanthus leafage. (2) Arches, quatrefoil, trefoil. (3) Cabriole leg. (4) C and S scrolls. (5) Carved feet. (6) Carved splats. (7) Lattice work, Chinese frets, geometric patterns, pagodas. (8) Ribbons. (9) Shell carving, leafage, flowers, fruit, rococo. (10) Scrolls.

COLONIAL FURNITURE. Broadly speaking, colonial furniture includes the household effects of the colonists from the time of the settlement at Jamestown until the war of the Revolution. Some include American Empire and Duncan Phyfe—to 1820. It excludes the work of the great English cabinetmakers of the late eighteenth century, as Sheraton, Hepplewhite, and the later designs of Chippendale. Different in thought and wealth, each colony evolved different styles. Colonial furniture was an adaptation by the first and second generations of American settlers of the English and Dutch, and other late seventeenth and eighteenth century European styles, all modified and simplified. Many pieces in the style of the Tudors and Jacobean were made in America.

There is nothing complex or elaborate about a colonial piece. It embodies in its lines and shapings characteristics of rugged worth and stern necessity typifying the struggles of our ancestors. It is useful, strong, plain, and dignified. Its chaste proportions, neat trimmings and manifest fitness to purpose give it a permanent place in furniture design. Extensive surfaces are unadorned except for the grain, and sometimes a little broad, simple carving.

COLONIAL CHAIRS, WINDSOR CHAIRS. From old records it appears that they were first used in Philadelphia and it is almost certain they were first manufactured in America in that city. These Windsor chairs were light, easy to make, and therefore inexpensive, and became the everyday chair of the colonial period.

COLONIAL SPINET DESK. Spinet desks are colonial. The spinet was a musical instrument with a keyboard, and when the instrument gave out, the keyboard was removed and the spinet became a desk. Usually they had spirally turned legs.

CONSOLE. In English furniture, the table supported by brackets which stood against the wall under a mirror was called a console. The French originated this piece of furniture. Some of the finest examples have their supports elaborately carved and gilded. All the eighteenth century cabinetmakers constructed console tables.

CRESTING. This is the name given to the perforated, carved, and gilded or silvered ornament superimposed above the top molding of lacquered cabinets of the late seventeenth century. In general, any ornamental details surmounting a piece of furniture and reaching right across from side to side are called a "crest." Usually it conveys a reference to a decorative addition merely, and is not a constructional part. The "crest" rail, however, of a chair denotes a top rail having ornamental character. Charles II and William-and-Mary chairs had very decorative crest rails.

CUSPING. The ornamental elaboration of the inside of the top of a pointed arch, consisting of pointed terminations flowing out from the main molding, and inclosing small spaces called "foils" are known as "cusps." Cusping is one of the most important decorative features of Gothic architecture. It was employed by Chippendale in chair backs, and in some Sheraton work there is a hint of it, particularly in the traceries of glazed bookcase doors.

UTILITY THE TEST

The attempt to relate art to industry and to education promises not only to revolutionize the teaching of art in the schools, but to do much toward laying the foundation for a new national art in America. We are beginning to see that art is utility expressed in terms of beauty, and that education is utility expressed in terms of training. Utility is the supreme test of art, of industry, and of education.—*E. O. Grover.*

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

LITTLE FOLKS' CLOTHING HANGERS

Leon H. Baxter, Hudson, Ohio

(See Supplement No. 116)

This is an interesting and simple little problem of practical value, different from the ordinary old-type coat hanger.

Half-inch wood is used in making these hangers; maple, gum, or birch being suitable.

Softer woods such as pine, bass, or whitewood may be used, but they are more liable to break if dropped.

Each hanger requires a piece 5¼ by 14½ in.

The outline of the hanger is traced, or sketched on the wood, and the cutting is done with a coping saw, sawing quite close to the line but leaving a small margin to smooth up with a file and sandpaper.

After it is sawed to shape, sandpaper all over and then draw in the features with a hard pencil.

This will leave a slight imprint in the wood which can still be seen after painting. Use the colors that are suggested on the drawing, and after they are dry, outline the features with a pen, using waterproof India ink. It has been found that show-card colors work very nicely with younger children, as they are easy to apply and dry almost at once.

Many other heads such as elephant, rabbit, chicken, cat, etc., may be used as suitable designs.

ELEMENTARY WOODWORKING JOINTS

John F. Faber and Jonathan Bright, Erie, Pa.

(See Supplement No. 119)

The chart of elementary woodworking joints gives those joints which are commonly met with in an elementary woodworking class. There will be some difference of opinion as to the content of this chart, for all classes are not conducted in the same way. The joints shown, however, cover the elementary work of most school shops.

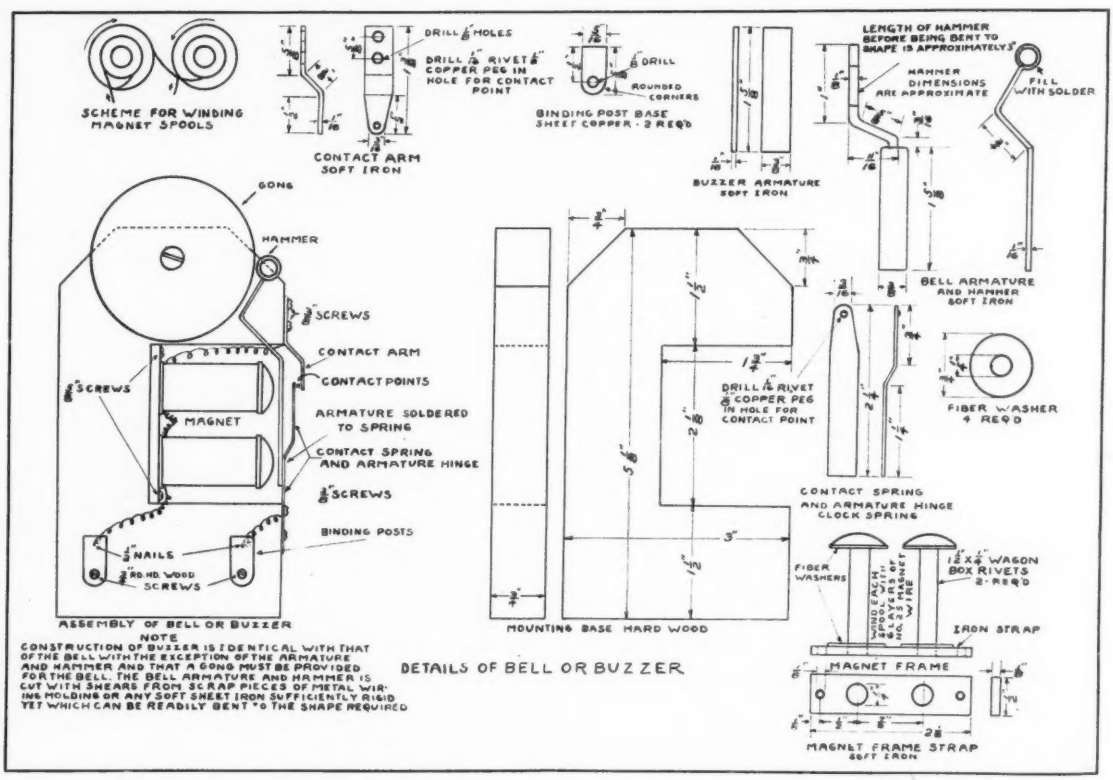
The places where each joint is commonly used are given under the name of the joint.

CONSTRUCTION OF A BELL OR BUZZER

E. A. Rerucha, Wakefield Township High School, Wakefield, Michigan

The student gains a much better understanding of the operation and adjustment of a bell by actually constructing one than he would otherwise. The bell and buzzer described herewith serve this purpose admirably. The greatest benefit can be derived, of course, when the device to be constructed embodies as nearly as possible all the features of the factory-made product, with which the student comes in contact in and about the home. However, for courses for which a certain amount of work has been prescribed and a limited period of time allotted, the instructor must necessarily select projects which will not require too much time. Being confronted with these conditions in his household-electricity course, the writer has designed the bell and buzzer to serve this purpose. It is simple in design and can be constructed in a relatively short period of time, yet it embodies most of the features found in the factory-made device.

Wagon-box rivets are used for the magnet-coil cores. Carriage bolts of similar size may be used. The washers are made of fiber such as is used in electrical work, or they may be made of cardboard. A layer of paper is wrapped around each core and on top of that, six layers of No. 25 magnet wire are wound. The completed winding is protected by a layer of friction tape or several layers of paper. A clock spring from which the temper has been drawn by heating is used for the spring hinge, and is soldered to the armature as indicated in the assembly drawing. The base is made of hardwood. The contact arm, and armature and hammer are made of soft iron and can be easily bent into the required shape. Metal wiring molding, which may be cut with tin shears, was used for this purpose with good results. The


SCHEME FOR WINDING MAGNET SPOOLS
DRILL 5/64" HOLES
DRILL 1/4" RIVET & COPPER PEG IN HOLE FOR CONTACT POINT
CONTACT ARM SOFT IRON
DRILL
ROUNDED CORNERS
BINDING POST BASE SHEET COPPER - 2 REQ'D
BUZZER ARMATURE SOFT IRON
LENGTH OF HAMMER BEFORE BEING BENT TO SHAPE IS APPROXIMATELY
HAMMER DIMENSIONS ARE APPROXIMATE
FILL WITH SOLDER
BELL ARMATURE AND HAMMER SOFT IRON
GONG
HAMMER
SCREWS
CONTACT ARM
CONTACT POINTS
SCREWS
MAGNET
ARMATURE SOLDERED TO SPRING
CONTACT SPRING AND ARMATURE HINGE
SCREWS
BINDING POSTS
NAILS
RD HD WOOD SCREWS
ASSEMBLY OF BELL OR BUZZER
DRILL 1/4" RIVET & COPPER PEG IN HOLE FOR CONTACT POINT
FIBER WASHER 4 REQ'D
CONTACT SPRING AND ARMATURE HINGE CLOCK SPRING
MOUNTING BASE HARD WOOD
FIBER WASHERS
WOOD SPOOL WITH 6 LAYERS OF NO. 25 MAGNET WIRE
1" X 1/4" WAGON BOX RIVETS 2 REQ'D
IRON STRAP
MAGNET FRAME
MAGNET FRAME STRAP SOFT IRON
NOTE
CONSTRUCTION OF BUZZER IS IDENTICAL WITH THAT OF THE BELL WITH THE EXCEPTION OF THE ARMATURE AND HAMMER AND THAT A GONG MUST BE PROVIDED FOR THE BELL. THE BELL ARMATURE AND HAMMER IS CUT WITH SHEARS FROM SCRAP PIECES OF METAL WIRING MOLDING OR ANY SOFT SHEET IRON SUFFICIENTLY RIGID YET WHICH CAN BE READILY BENT TO THE SHAPE REQUIRED
DETAILS OF BELL OR BUZZER

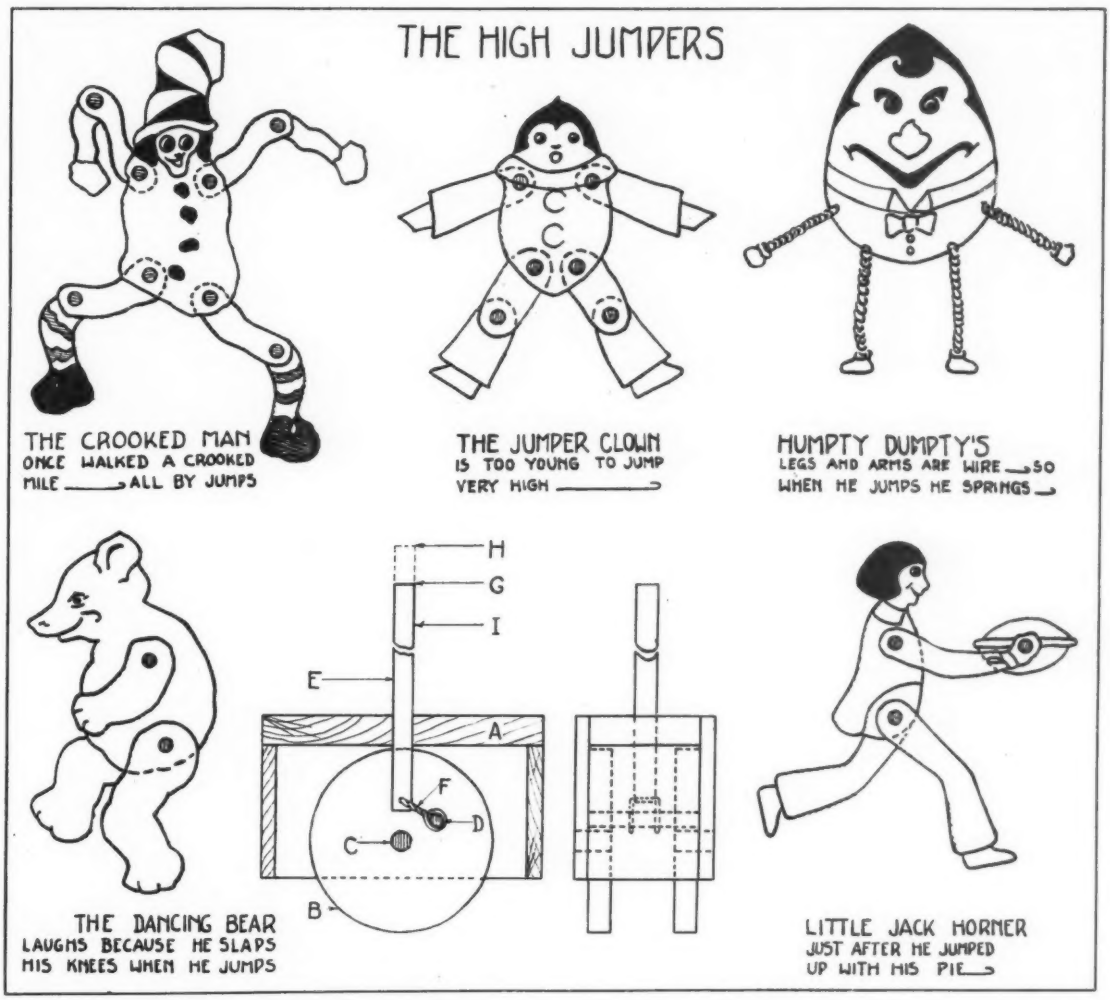
contact points of the circuit breaker are made by riveting pieces of copper wire into holes in the contact spring and arm.

The construction of the bell or the buzzer is identical except that a hammer and gong must be provided for the bell. These are shown in place in the assembly drawing. Final adjustments of hammer, contact spring, and arm are made after the parts are assembled so that the proper stroke of the hammer is obtained.

THE HIGH JUMPERS

Margaret Fullerton

The Crooked Man, the Clown, the Dancing Bear, Humpty Dumpty, and Little Jack Horner are all members of the High Jumper's family. If they are mounted on strings or on the end of a stick they act like ordinary jumping jacks, but they could never have become winners as high jumpers had it not been for their little boxlike stage on which they perform.



The bodies of the Clown and the Crooked Man must be cut double. The front and the back pieces are fastened together with dowel pins which act as hinges upon which the joints move. Humpty Dumpty needs only one piece for his body because his legs and arms are made of wire springs which are set into the edge of the board out of which the body is cut. The dowel pins in the Dancing Bear and Jack Horner are fastened to the arms and legs with the bodies hinged between. Jack Horner runs so fast with his pie that he cannot always hold it straight in front of him. It jumps over his head, it hits on his knees, but it never spills because he holds it so tightly between his two hands that it always stops right side up.

Any of the High Jumpers may be cut with a jig saw from cigar boxes, beaver board, plywood, or other thin durable material. After the pieces have been sanded, apply one or two coats of flat paint to the sides and edges. Sand each coat when dry. Trace on the designs. The arms and legs of the Crooked Man and the Clown are painted, varnished, and allowed to dry before the body parts are assembled. After the glue, which holds the dowels in place, has thoroughly hardened, the ends of the pins are sanded flush with the front and the back surfaces of the bodies. They are then painted and varnished. The insides of the arms and legs and the bodies of Jack Horner and the Dancing Bear are painted and varnished before they are assembled; the outsides of the legs and arms are painted after assembling, in order to hide the ends of the dowel pins.

Enamel gives the most satisfactory finish. Flat white paint or flat enamel is used for the under coat. The final application of valspar adds gloss and durability. Poster paint or other apaque water color may be used over a priming coat of the same medium. A coat of valspar over this will prevent the paint from rubbing off.

Jack Horner, the Clown, and Humpty Dumpty may be painted almost any color because no one really knows how their clothes looked, or which ones they wore the day they had their pictures made. The Crooked Man should not be one color only, but may be painted with almost every color, with crooked stripes on his socks, and bright buttons and bands on his clothes and hat. The Dancing Bear was once just a big brown bear with a sunny-colored smile and black or yellow toes, and he never changed from those colors even after he learned to jump.

It is not skill alone which assures a jumper that he can always give a good performance; there is really a trick to it. It makes no particular difference whether you give him a wooden candy chest, or a specially made platform to stand on, but he must have a stage, similar to that shown in the illustration. The cover should be reinforced, if a ready-made box is used, by the addition of a piece of ¾-in. board. This may be put inside or outside of the original cover.

The platform the high jumpers perform on, consists of a box A mounted on wheels B. These wheels revolve on axles C, which are short pieces of dowel firmly glued into holes in the center of the wheels and set through corresponding holes in the sides of the box. They are not glued to the box however. The two wheels are fastened together by a third dowel pin D which is glued to each at points between the centers and rims of the wheels. The high jumpers are mounted on the top of the vertical dowel E which projects through a hole in the top of the box. Its lower end is attached to the dowel pin D by means of the twisted-wire connecting rod. It is easily seen that each revolution of the wheels thus serves to impart a straight up-and-down motion to the high jumpers, in the same manner that each revolution of the crankshaft on an automobile moves the pistons up and down in the cylinder. G represents the height of the perch with the wheels in the position drawn, while H shows it at the highest point which it attains during each revolution; I represents the lowest point which it attains during each revolution. The vertical motion of the jumpers is varied by the size of the wheels. The jumpers' platform is drawn by a wagon tongue fastened to one end. This is not shown in the drawing.

For every time the wheels go around, the High Jumper gives one big jump. If he is feeling gay, or if you have given him an especially good stage and painted it to match his clothes, he will never fail to give a couple of extra kicks as well as a jump to show his appreciation.

A BATTERY CHARGER

Charles Rice, Everett, Wash.

This simple battery charger, "trickle charger" or "booster" for a radio set, is designed as a project for the shop instructor, who is looking for an electrical unit which he can introduce into his woodshop program. It serves also as a simple project for the junior-high-school electrical class. The writer used this project several years ago and found that it was useful in creating interest in electricity as well as in teaching a few electrical principles to seventh-grade boys.

No tools are needed that are not readily found in the ordinary woodshop. The materials, in most cases, may be brought from home by the boys.

Equipment Required:

One preserve glass, about 6 in. high.
One piece of sheet lead, 1¼ by 6½ in.
One piece of sheet aluminum, 1¼ by 6½ in.
Wooden cap for jar, 1 in. thick by 3½ in. in diameter. (May be sawed out or turned.)
Wooden base, ¾ by 4 by 11 in.
Wooden ring, or a wire bail for holding glass jar to the base.
Two binding posts. (Dry-cell terminals may be used instead of binding posts.)
One toy transformer or a bell-ringing transformer.

The Transformer

Many boys have transformers, tapped to give a short range of voltages for running small electric toys, that will serve as part of the project. A bell-ringing transformer of the step-down type, giving various voltages up to 18 volts will serve very well. A transformer of this type is designed to draw very little or no current and for this reason is not expensive to operate. Fasten the transformer to the wooden base leaving enough space for the cell. The transformer and cell may be left connected to the battery for a long period of time without overheating.

The Rectifier Cap

The jar cap is made of wood and may be sawed out of ½-in. stock and glued up, or it may be turned up of 1-in. stock. After the cap has been formed and the holes made for the vent and the two terminals, it should be dipped into hot paraffin or soaked in shellac to close the pores of the wood. The cap may be held to the jar with a wire clamp, or by pouring paraffin into the recess between the cap and the jar as shown in the illustration.

The Rectifier

Fasten the glass jar to the wooden base, near the transformer. This may be done with paraffin, as shown.

With the lead and aluminum plates in place, pour the solution through the vent hole into the jar.

Solution

Two tablespoonfuls of baking soda.
Two teacupfuls of distilled water.
Three tablespoonfuls of vinegar.

Note: A solution of borax and distilled water may be used if preferred. In some parts of the United States, the city water may be used without attention to distillation.

Pour the solution into the jar, holding back any sediment that may have formed.

Forming the Cell

The cell is now ready for the forming process. After the transformer has been plugged into the 110-volt line, the cell is connected across the transformer and the current allowed to pass through the cell for 10 hours. As the cell forms, a light-gray coat of aluminum oxide is produced on the aluminum plate. The formation of this oxide is very important as it serves as an insulation against the current flowing toward the aluminum plate, but does not hinder the current flow in the opposite direction, that is, from the aluminum plate to the lead plate.

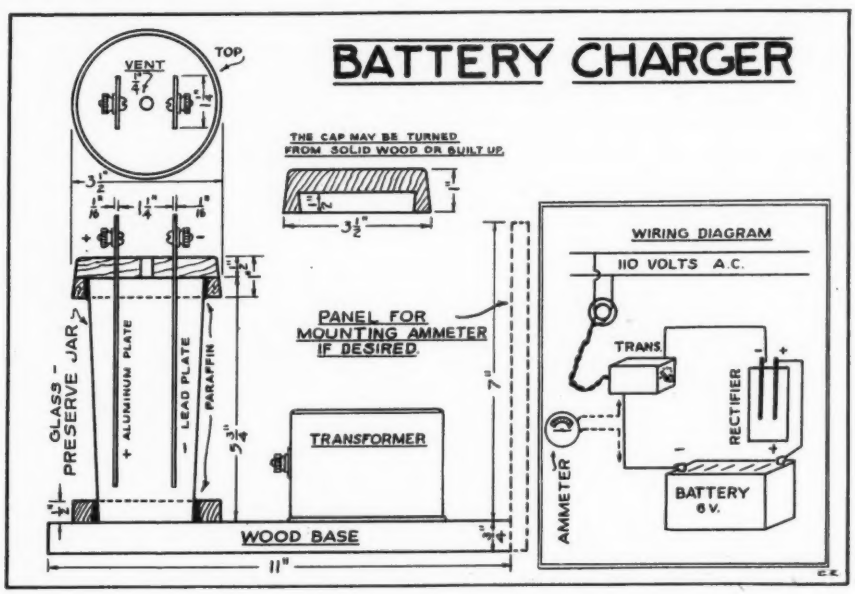
After the cell has been formed, it may be hooked up for charging batteries up to 6 volts, as illustrated. The charging may take place while the radio set is in operation and thus serves as a "booster" for the battery.

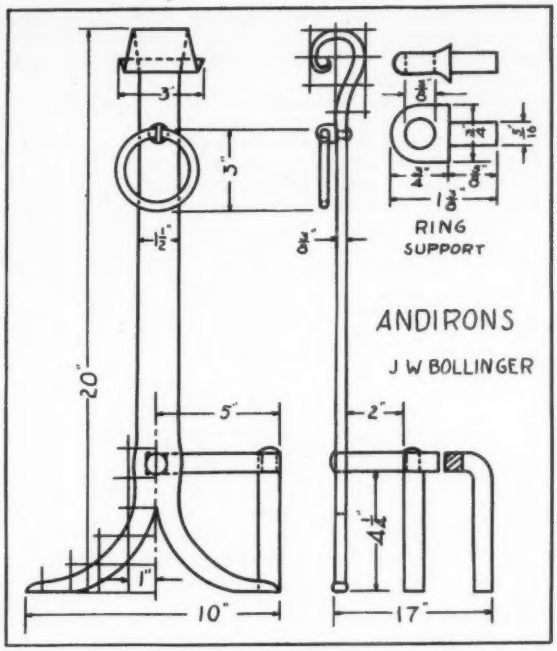
ANDIRONS

J. W. Bollinger, Tulsa, Okla.

The andirons described herewith were designed for the fireplace in the average-size living room. Some boys have made them for their fathers' hunting lodge. The irons are sturdily made and will give lifelong service.

The post is made of ⅜ by 1½-in. iron, cut 26 in. long. The feet are made by cutting 8 in. down the center of the leg, and spread-





ing them out as shown. The feet must rest flat on the floor, and the post must stand up straight.

A scroll is shaped on the upper end of the post. Begin by thinning and spreading out this end, until it is 3 in. wide and about $\frac{3}{32}$ in. thick. Smooth the end with the help of the flatter and sledge, and grind it to its final shape. The bending is started over the rounded edge of the anvil face. After as much of the bending as possible has been done in this way, the post is placed upright on the anvil, and the scroll bent downward. The post is then laid down on the anvil, and the curve closed up until the proper shape has been produced.

The ring is 3 in. in diameter and is made of $\frac{5}{16}$-in. round stock cut 9½ in. long. The ring is curved over the horn of the anvil. The ends are brought together to form a butt joint. It is not necessary to braze or weld the joint.

The eye for holding the ring is made by flattening one end of a short piece of ⅜-in. round stock. The stem is then turned down to $\frac{5}{16}$ in. on the lathe. After drilling the ⅜-in. hole in the flattened part, the eye is riveted to the post, and the ring slipped in place.

The back runner is a piece of ¾-in. square steel, cut 27 in. long. One end is turned down to a ⅜-in. shoulder on the lathe, so that the back runner may be riveted to the post. The runner is bent so that the andirons may be placed close together for burning short lengths of timber. To brace the runner, a short piece of ¾-in. square stock is riveted to it as shown in the illustration.

The most suitable finish for these irons is two coats of flat black paint.

ART FIBER WORK

Stanley Mythaler, State Teachers College,
Valley City, North Dakota

Out of our experience of several years with art fiber work, three pieces seem to have shown special merit because of the demand which they have created. They are described in this article.

The Hanging Basket

This is especially attractive on the porch or in a sun parlor. Four cone containers may be cut from a 20 by 28-in. sheet of roofing tin. Bend the cone to shape by hand, solder, and leave the point open for a drain. Tie the stakes to a turned block or spool. Put a stake in a bench vise, invert the cone on the stake, place the tied stakes on the cone and start weaving under two and over two. About one third the distance up, change to an over one under one weave. Weaving around three times with a flat weaver near the top will add a little decoration. Make the handle out of stake material.

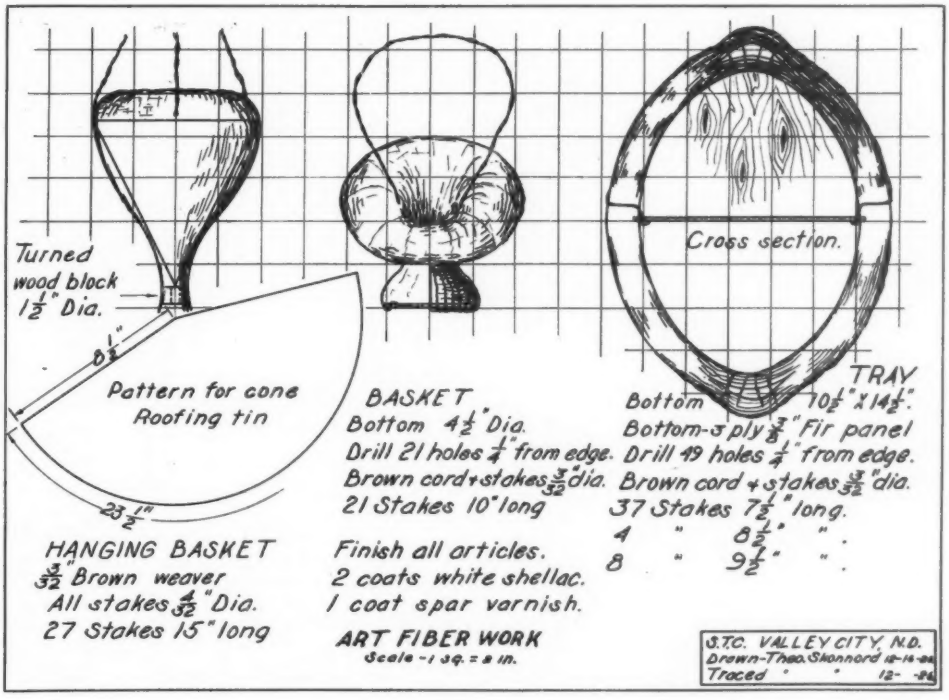
The Basket

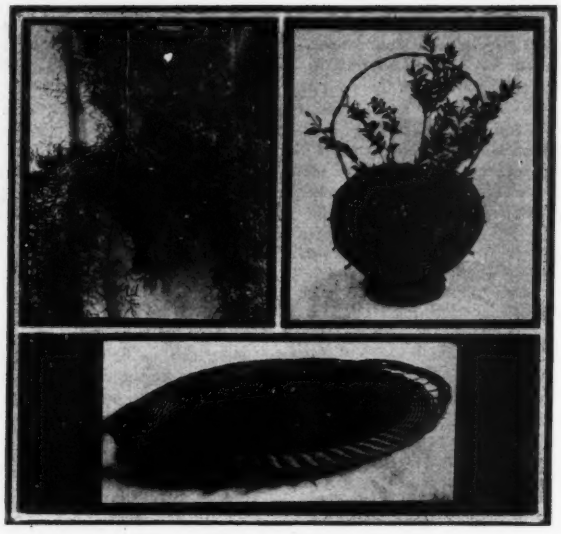
The basket is a good exercise for beginners. The stakes are put through the holes and then bent up outside of the edge. We finish the top by cutting the stakes flush with the weaving. The weaving is all simple under and over weave. The basket is finished by dipping in green water stain and then applying two or three coats of shellac.

The Sandwich Tray

The bottoms are cut out of ⅛-in. fir plywood. One may be laid out and drilled. This can then be used as a template for drilling the others that may be wanted. A No. 35 wire-gauge drill is the proper size to use.

The edges of the bottom are sanded on a disc sander. Next, stain and shellac the bottom, after which the stakes should be cut and inserted. Then weave a three-rod coil under and over five times around. Next bend out the stakes at right angles and weave fifteen times around. Finish the edge by bending over two and under one. Give the fiber two or three coats of white shellac and one coat of spar


Turned wood block 1½" Dia.
Pattern for cone Roofing tin
Cross section.
HANGING BASKET
3/32" Brown weaver
All stakes 4/32" Dia.
27 Stakes 15" long
BASKET
Bottom 4½" Dia.
Drill 21 holes ¼" from edge.
Brown cord + stakes 3/32" dia.
21 Stakes 10" long
Finish all articles.
2 coats white shellac.
1 coat spar varnish.
ART FIBER WORK
Scale - 1 sq. = 1 in.
TRAY
Bottom 10½" X 14½".
Bottom-3 ply ⅜" Fir panel
Drill 49 holes ¼" from edge.
Brown cord + stakes 3/32" dia.
37 Stakes 7½" long.
4 " 8½" ".
8 " 9½" ".
S.T.C. VALLEY CITY, N.D.
Drawn-Theo. Skonnord 12-14-28
Traced " " 12- -28



varnish. While varnishing the fiber, pour some varnish on the bottom and then tilt it so that the varnish flows over the entire surface. Put away to dry in a horizontal position. We have finished over three hundred trays during the past year, and the foregoing method is the result of our experience.

WROUGHT-IRON END TABLES

A. J. Werrell, Carlos M. Cole Jr. High School, Denver, Colo.

The art of the iron worker lends itself in a charming way to the construction of a small end table as shown herewith.

Aside from the ornamental and educational value derived from this representative of wrought-iron handcraft as a class project in the school shop, many of the parents and older brothers may want to try out their skill in the shop at home.

This design does not call for a forge or for a large kit of tools. It does, however, call for careful measurements and fittings of component parts, and the fastening of these parts by riveting.

All bending, twisting, and riveting is to be done cold. It is well to remember that it is much easier to make the first bend properly, than it is to straighten a piece of bent metal and make a new bend of the type desired.

All metal parts are of band iron. Should the student have difficulty in twisting the ½ by ½-in. cross pieces cold, two large wrenches may be used instead of one on the end opposite the one in the vise. In this manner two students may succeed to put the proper twist on the piece without bending it entirely out of shape. The top, which is made of quartered red gumwood is fastened on with wood screws.

The entire project may be finished with a sprayed coat or two of lacquer. There are several handsprayers on the market now, which can be purchased very reasonably and which do a creditable job. The color is optional depending on the color scheme where the piece is to be used, but wrought iron always looks well in black trimmed with bronze. The top may be finished natural with clear lacquer if desired.

Bill of Material

4 pc.	¾ x	$\frac{3}{16}$ x 36	Band Iron
2 pc.	¾ x	$\frac{3}{16}$ x 24	Band Iron
2 pc.	½ x	⅛ x 30	Band Iron
1 pc.	½ x	½ x 20½	Cold-Drawn Steel
1 pc.	½ x	½ x 19	Cold-Drawn Steel
1 pc.	12	x 23	Quartered Red Gumwood

EARLY AMERICAN SCROLLED TABLE AND COLONIAL MIRROR

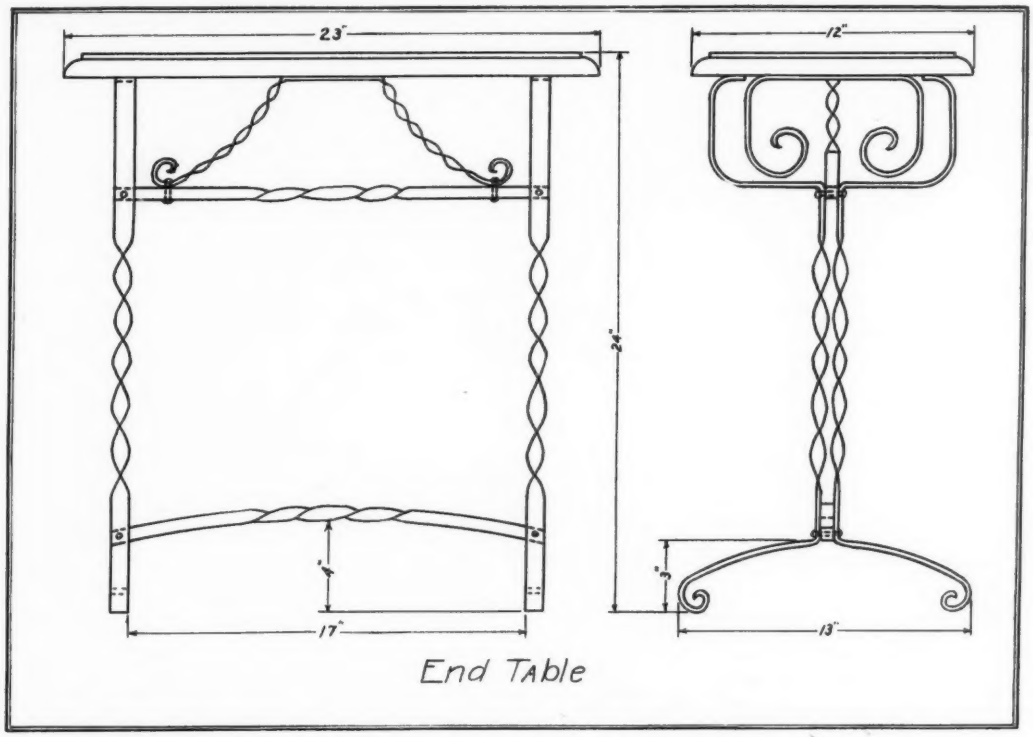
Franklin H. Gottshall, Director of Industrial Arts, Mount Berry School for Boys, Mount Berry, Georgia

The small table and scrolled mirror described herewith form a very interesting combination for a hallway. Neither one is very difficult to make and they both help to prove the fact that simple lines and methods of decoration are often the most pleasing.

The table has well-turned legs which are almost architectural in design. They end below in almost a perfect ball. Very often in antique examples of early work we find that part of the foot is almost worn away. We can prevent this by putting "domes of silence" on them.

The edge around the top is molded. Since very few school shops are lucky enough to have a shaper, this can easily be made with nothing more than a chisel and a block plane. Set the gauge at 1 in. and mark around each edge. Then lower this 1-in. edge $\frac{1}{16}$ of an inch, after which take the block plane and round over the rest of it. A rasp will also be of great aid in this operation.

It will be noticed that all joints come flush on the outside, thus following the best early method of construction. They are all mortised,



WROUGHT-IRON END TABLE DESIGNED BY A. J. WERRELL, DENVER, COLO.

tennoned, and pinned with square oak pins, set in a round hole slightly smaller in diameter than the pin. The stretchers below are also fastened in this way. They are slightly rounded on the top edge.

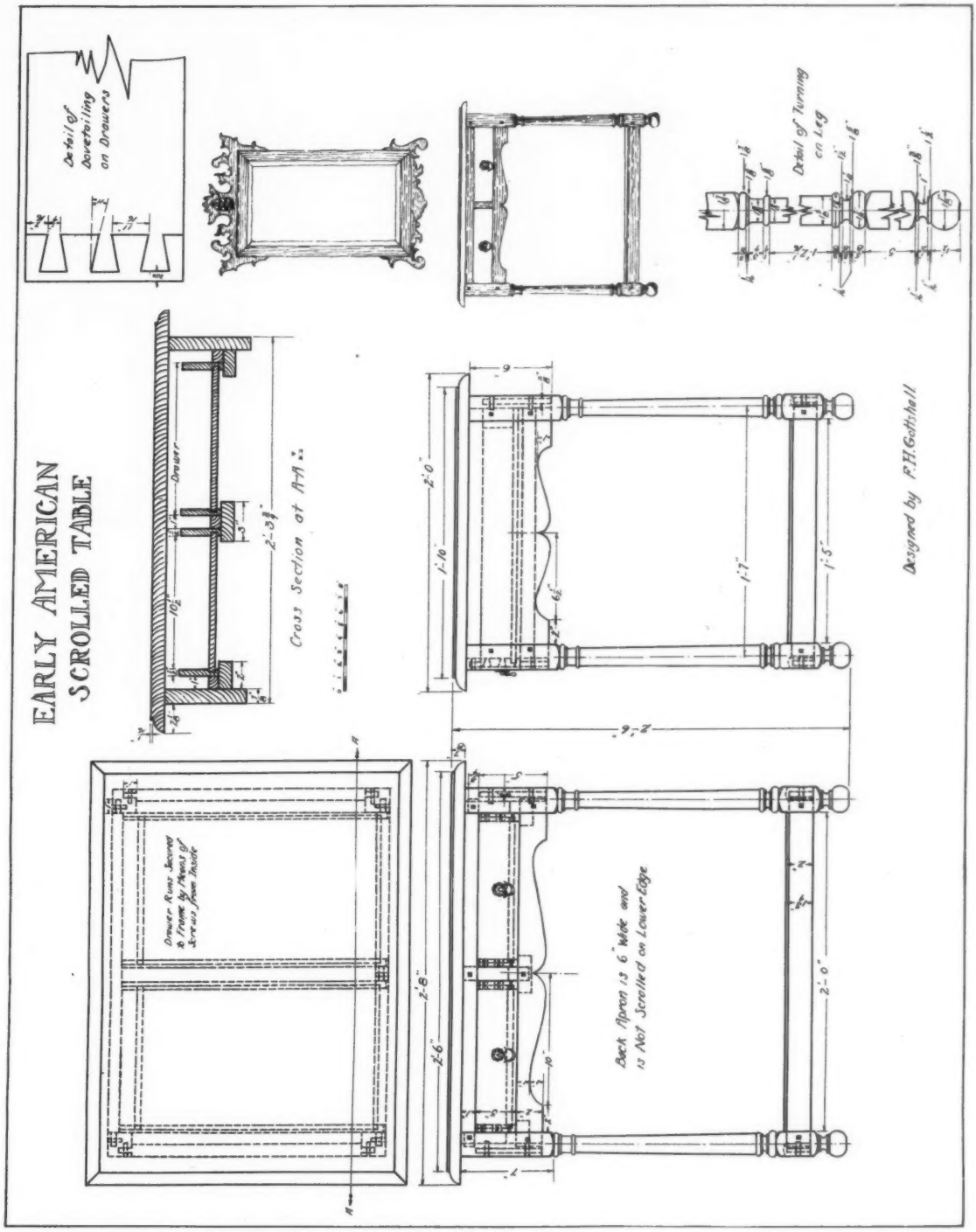
The drawers are blind dovetailed. Handmade dovetailing is beautiful when well done. Old-time cabinetmakers used the 11-deg. angle in laying out dovetails, and the dovetails on the sides of the drawers were always made smaller than the space between them. The drawer fronts close flush with the front of the table.

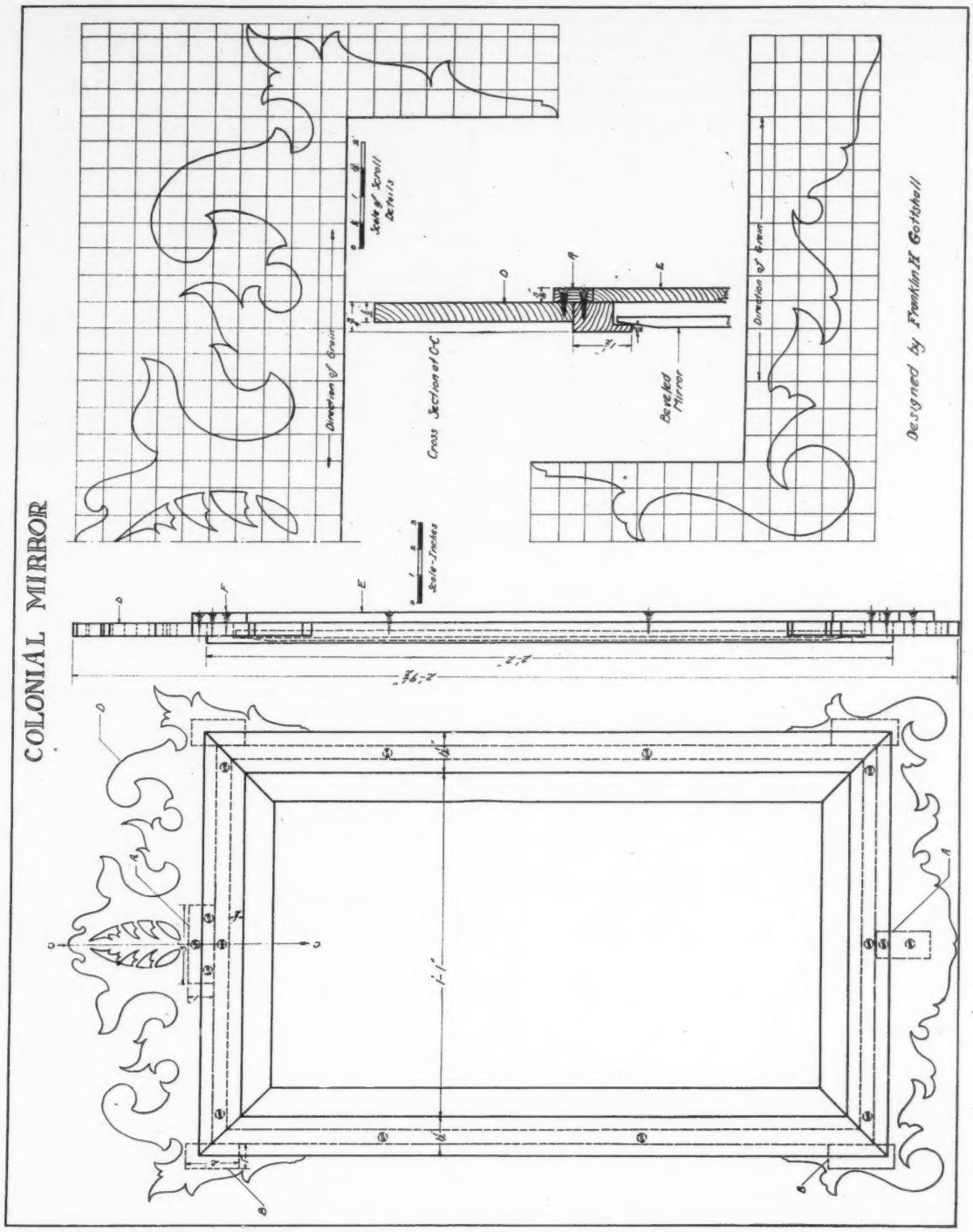
Correct hardware is very important and there are now many firms who make a business of reproducing colonial hardware. Cheap hardware will mar any piece of good furniture.

The colonial mirror described in this article, would attract attention wherever it might be placed. The fact is that a beautiful mirror, when well placed, forms a better decoration than a picture does.

A simple and at the same time a fairly accurate method of laying out the scrollwork is shown at D. One-half-inch stock is used and the scrolls are cut very carefully with a coping saw.

The frame is made first. It is then laid on the board from which the scrolls are to be cut, and its outline is carefully traced with a knife. After the scrolls have been cut out, they are fastened to the frame by means of small blocks A which are glued on, and blocks B which


EARLY AMERICAN
SCROLLED TABLE
Detail of Dovetailing on Drawers
Detail of Turning on Leg
Cross Section at A-A
Drawer
Designed by F.H. Gottshall
Drawer Runs Secured to Frame by Means of Screws from Inside
Back Apron is 6" Wide and is Not Scrolled on Lower Edge



are fastened with screws to both. If there is any danger of splitting, screws must not be used.

After the mirror has been fastened in the frame it is backed up with a thin board E to prevent roaches and other insects from getting into it and eating off the silver plate.

DRESSER CHEST

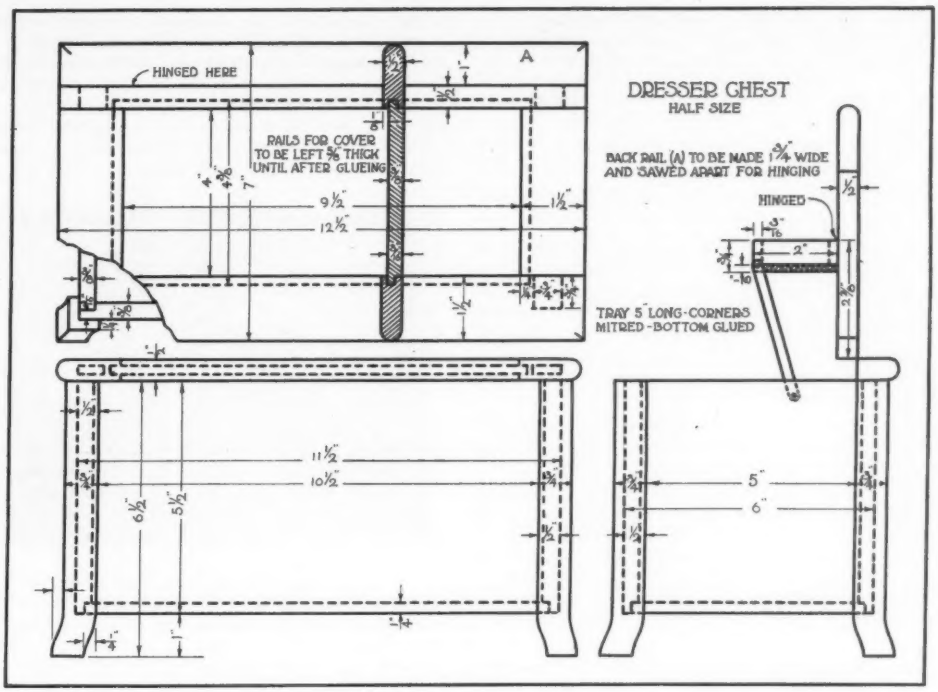
W. H. Morton, Walker Manual Training School, Portland, Maine

The dresser chest described herewith is equipped with a hinged tray which is so arranged that it opens when the cover of the chest is opened. The tray is designed to be used for collar buttons, tie pins, cuff links, etc. The tray-opening link also acts as a stop for the chest cover as is shown in the illustration. When the chest cover is closed, the hinged tray closes back against the cover, so that its contents are protected against loss. As shown in the illustration, the tray is about one half as long as the chest.

COLLAPSIBLE POULTRY-EXHIBIT CRATE

L. M. Roehl, Assistant Professor, Cornell University, Ithaca, N. Y.

Exhibitors of poultry at county and community fairs are often handicapped for the want of suitable crates for showing the birds to their best advantage. Boxes of many sizes and shapes are used and



the show as a whole does not make as desirable an impression as it would if the crates were all of the same kind, and of a design that would show up the fowl properly.

Assembled crates present a disadvantage in being bulky to transport and store.

The collapsible crate shown in the accompanying drawing has several points in its favor. All material in it is to be had at the local hardware store and lumber yard. It is inexpensive and simple enough in construction for boys to make. The disassembled crates occupy very little space and a large number of them can be conveyed on a light truck or car. Then too, they are easy to keep clean.

One county junior project leader had two of the crates made to try them out. They worked so much to his satisfaction that he ordered fifty to be made for his work in the county.

Following is a bill of the material and directions for construction:

1 circular floor ⅞ in. thick and 22 in. in diameter.

2 cleats ⅞ by 2 by 16 in. for floor, assemble with 6d common nails; the nails to be clinched.

1 piece of galvanized sheet iron 3 in. by 5 ft. 10 in. This is to be nailed around the floor.

1 piece of ¾-in. mesh poultry netting 24 in. by 5 ft. 9 in. (20-in. or 22-in. netting will do if it is available.) If ¾-in. mesh is not available, use 1-in. mesh, the ¾-in. is stiffer however.

2 pieces of wood ½ by 1½ by 24 in. These pieces are to be fastened to the ends of the poultry netting with poultry-netting staples as shown at A.

4 1½-in right-angle screw hooks to hold the netting to the floor.

1 piece of wallboard 24 in. in diameter for the top.

6 pieces of wood ⅞ by 2 by 2 in., for cleats under the top. The top is fastened to these with shingle nails. Place one 6d common nail in each block to hold the top in place.

2 pieces of leather 1 by 3 in. for hinges. Fasten these to the wallboard top with staples or shingle nails.

2 2-in. hooks and eyes to hold crate together when it is assembled. After having cut the circular top with a compass saw, cut the door with the crosscut saw as shown by the lines in the top view.

1 drinking cup. Wire may be wound around the cup, twisted together, and the ends bent so that the cup can be hooked

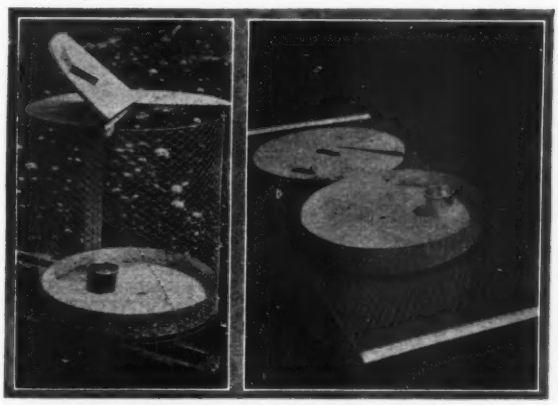


FIG. 2. THE CRATE WITH THE DOOR OPEN
FIG. 3. THE CRATE READY FOR SHIPMENT

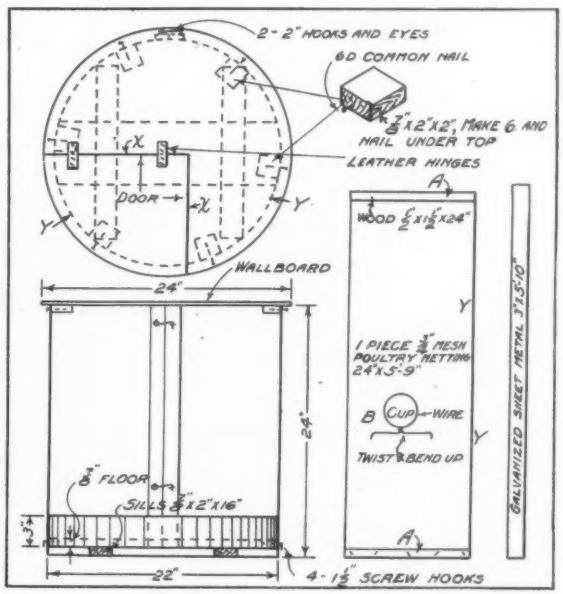


FIG. 1. COLLAPSIBLE POULTRY EXHIBIT CRATE

where desired. (See detail B.) Should poultry netting of larger mesh be the only kind available, additional strips ½ by 1 by 24 in. may be placed at points Y to stiffen the crate. To take down the crate, lift off the top, unhook the netting and remove it from the base and lay it out flat. Figure 3 shows the crate ready for transportation or storage.

A DEVICE TO ASSIST IN THE GRADING OF MECHANICAL DRAWINGS

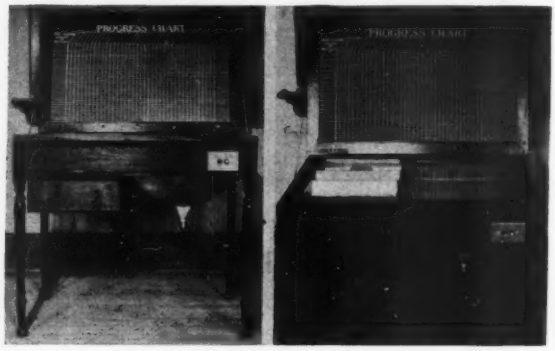
G. M. Quackenbush, State Teachers College, Buffalo, New York

Probably one of the most difficult and time-consuming tasks faced by any teacher is that of evaluating the work of his pupils. The success of teaching can be ascertained only through measuring the product, and this means some form of examination of the pupil and his work. If examinations are to be worth the time of the teacher and of his pupils, they must, as far as possible, give results which conform to a known standard and which reduce to a minimum the variation caused by unaided judgment.

This article is written with the hope of presenting a suggestion which will enable drafting teachers to grade drawings with a minimum of variation and in the least possible time.

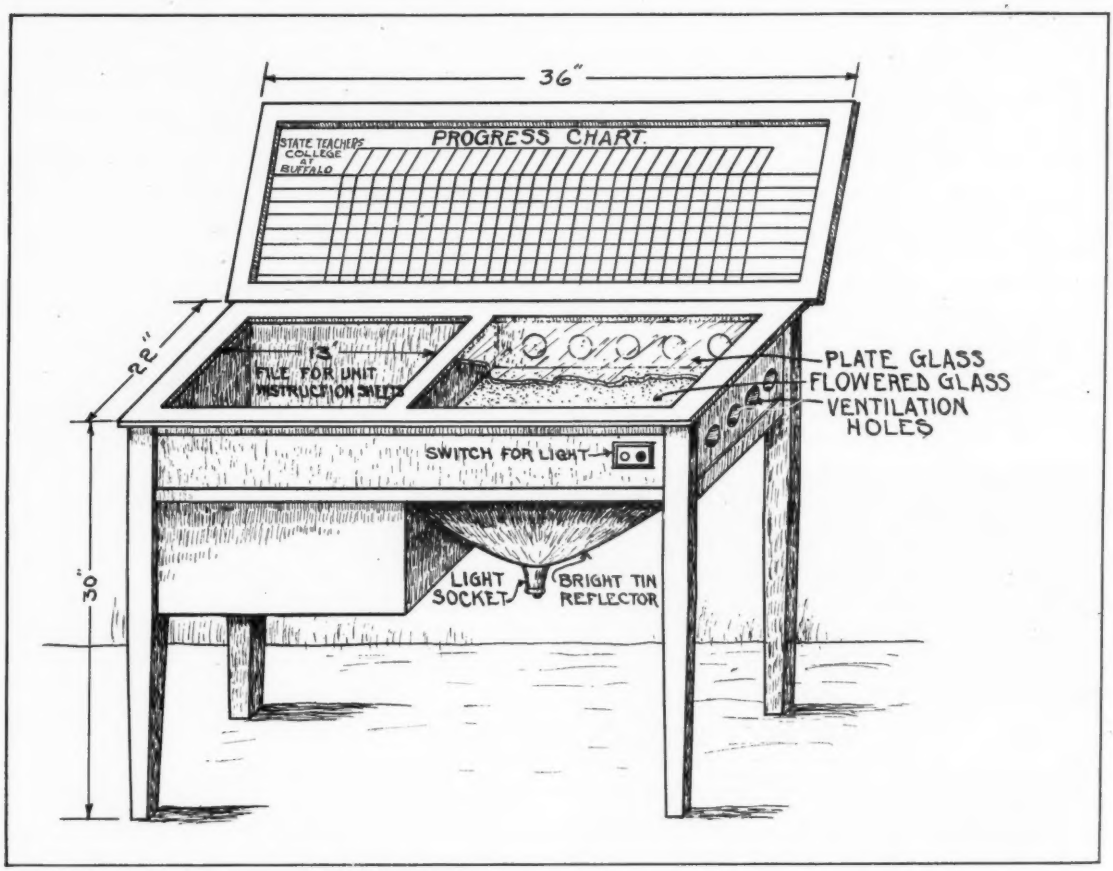
If we were to analyze the task of the teacher of mechanical drawing we would probably divide it into three major groups. First, that of building a course of study which will most adequately fit the conditions of his particular classroom. Second, that of determining the methods of administering the course of study. Third, that of checking the results of his teaching. This article will deal only with the last of these groups, and will consist of the description of a device to aid in this work.

To make the working of this device clear, it will first be necessary to describe briefly the course of study with which it is used. This is compiled in the form of unit instruction sheets, each unit consists of a practical work unit and a related information sheet. The practical unit consists of a graphical representation showing the pupil what to do and how to do it. The method of presenting the problem is varied to meet the developing ability of the pupil. Necessarily, the drawing which accompanies the instructions in the practical unit, is not the same that he is expected to make. Sometimes the problem is presented orthographically, at other times pictorially, and again as a combination of the two. It is not necessary to describe the course of study in detail, but it is desirable to make clear that the drawings shown in the practical unit are in no case copied.



A set of master drawings have been made from these instruction sheets, sometimes by the better pupils and sometimes by the instructor. These have been checked very carefully in every detail. All of these master drawings are made on a good grade of tracing cloth and are used as a standard against which the work of the pupil is judged.

Now a word as to the making of the checking device herewith described. An old discarded table was rescued from the attic of the school. This measured about 22 by 36 in. The top of the table was removed and a boxlike file was built in the left end. Since the size



CHECKING DEVICE, DESIGNED BY G. M. QUACKENBUSH, STATE TEACHERS COLLEGE, BUFFALO, N. Y.

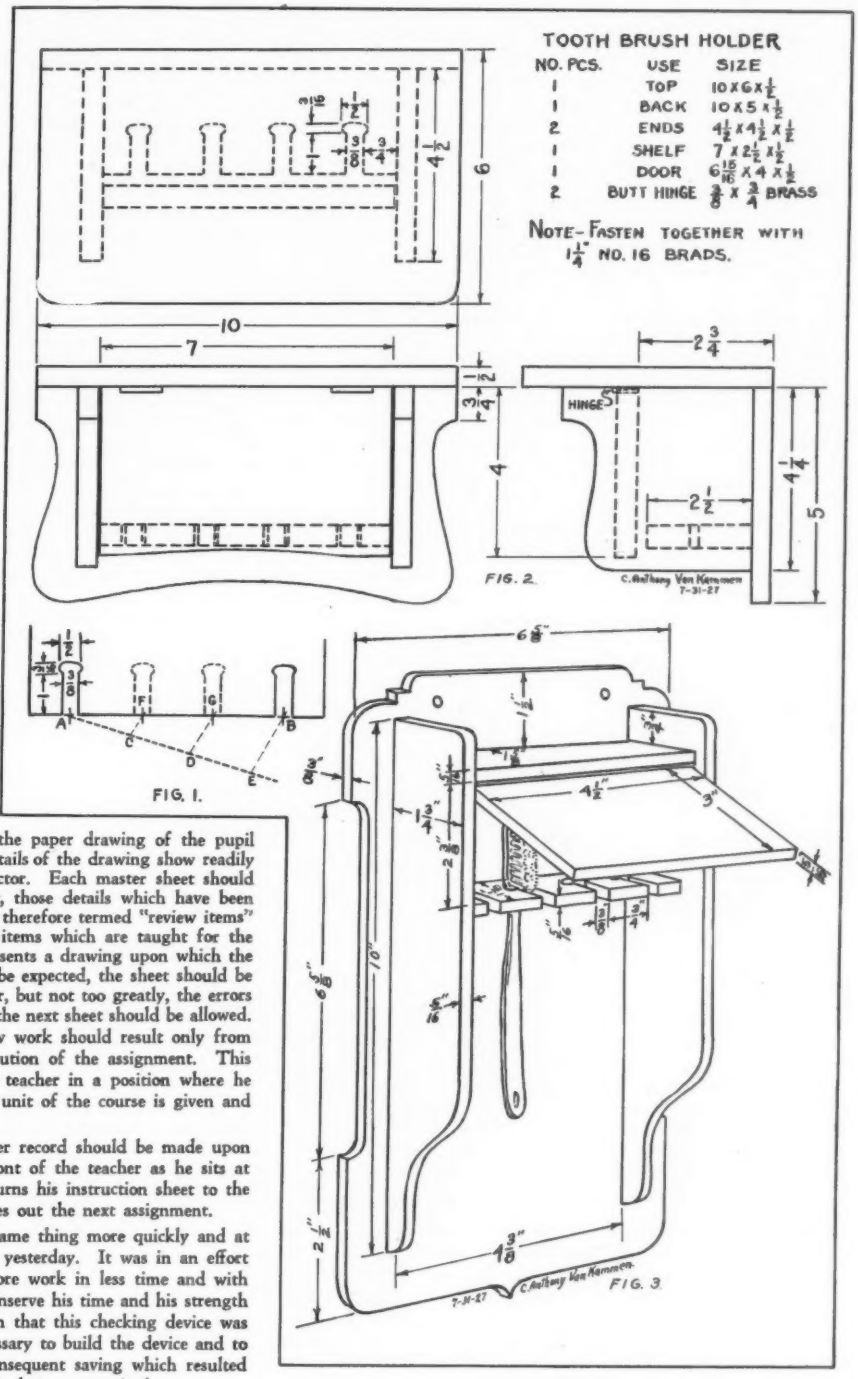
of the greater number of instruction sheets is 9 by 12, the file was made large enough to accommodate these. The front part of the file holds the instruction sheets while at the back is reserved a space for the master sheets.

Underneath the table to the right, a bright tin reflector of parabolic section, was fastened. This is equipped with a 100-watt light with a switch in the front rail of the table. At the top of the reflector, resting on small wooden cleats nailed to the bottom of the rails, is a piece of flowered glass, and level with the top of the table is a 3/16 piece of plate glass. The air space between these two glasses is ventilated by a number of 1 in. holes, as shown in the illustration. The top is hinged. It has chain stops which hold it a little back from vertical when it is open. The inside of this top is covered with a piece of thin linoleum upon which a progress chart has been painted in white. The names of the pupils are printed on the chart in white pencil, as are also the lesson units. This arrangement permits of any change which may be necessary and at the same time allows the use of a permanent chart. Progress of pupils is indicated by the use of colored thumb tacks which are inexpensive and show up well against the green linoleum.

When a pupil has completed a given drawing and presents it for grading it takes but a very few seconds to pick the master drawing from the file, place it upon the glass, and to switch on the light. The pupil's drawing is then superimposed over the master drawing, the latter showing through the paper drawing of the pupil quite clearly. Errors in plotting or in details of the drawing show readily and can be checked off by the instructor. Each master sheet should have upon it two specifications. First, those details which have been taught by some previous sheet and are therefore termed "review items" on the present sheets. Second, those items which are taught for the first time on this sheet. If a pupil presents a drawing upon which the review items are not as good as could be expected, the sheet should be made over. If the new work is in error, but not too greatly, the errors should be pointed out, and progress to the next sheet should be allowed. Failure of a sheet on the basis of new work should result only from serious error in comprehension or execution of the assignment. This form of procedure places the drafting teacher in a position where he is able to say definitely just why each unit of the course is given and just why it is given at that time.

Once a sheet is graded, the proper record should be made upon the progress chart, which is just in front of the teacher as he sits at the grading table. The pupil then returns his instruction sheet to the teacher who files it at his left and gives out the next assignment.

The spirit of today is to do the same thing more quickly and at the same time better than it was done yesterday. It was in an effort to enable the teacher to accomplish more work in less time and with a greater degree of accuracy, so as to conserve his time and his strength for the many demands made upon him that this checking device was built. Some effort, of course, was necessary to build the device and to complete the master sheets, but the consequent saving which resulted more than compensated us for the work that was required.


TOOTH BRUSH HOLDER
NO. PCS. USE SIZE
1 TOP 10 X 6 X 1/2
1 BACK 10 X 5 X 1/2
2 ENDS 4 1/2 X 4 1/2 X 1/2
1 SHELF 7 X 2 1/2 X 1/2
1 DOOR 6 15/16 X 4 X 1/2
2 BUTT HINGE 3/8 X 3/4 BRASS
NOTE- FASTEN TOGETHER WITH 1 1/4" NO. 16 BRADS.
FIG. 2.
C. Anthony Van Kammen 7-31-27
FIG. 1.
FIG. 3.
C. Anthony Van Kammen 7-31-27

TOOTHBRUSH HOLDER

C. Anthony Van Kammen, Grand Rapids, Michigan

Every problem made by a boy in the manual-training department should be beautiful as well as useful. It should be the ambition of each teacher to continually improve the design of the projects offered through the cooperation of the boys of the class. By this is meant that if an entire class is to make a toothbrush holder, when the finished products are placed side by side no two of them should be exactly alike in contour. The general proportion will be the same, for the use or purpose of the object made will determine the structural measurements. In your class one boy may be the only child in a family, while another is one of a family blessed with six or more children. Shall both boys make exactly the same toothbrush holder to accommodate four tooth brushes?

Before beginning work, a discussion of the quality of line to be used, with the correct combination of straight and curved lines of proper measure should be illustrated at the blackboard. This is described in the article on the "Wall Shelf," on page 252 of the July, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE. Though each boy will draw, free-hand, his own contour lines, it is true that in a large class there will very often be a great similarity in some of the outlines.

The width of a toothbrush holder will, of course, depend upon the number of brushes it is to accommodate. Figure 1 shows a plan for four brushes, and a method of dividing a line into a given number of equal parts. The space between the brushes should not be less than ⅜ in., nor should the holder notches or openings be closer than ½ in. from the side walls. After the two outside brush notches are located, the next problem is to divide the remaining space into the proper number of equal parts. The length of the line or space to be divided is equal to the distance from the center of the two outside notches, or from A to B, in Figure 1. From the point A draw a line at any convenient angle. Lay off as many equal distances AC, CD, DE, etc., on this line as are desired on the other line. Any handy unit may be used. Draw a line from the last point E to the right point B of the first line. Draw lines from points D and C parallel with EB intersecting line AB at G and F. The distances AF, FG, and GB will then be of equal length. Planning the notches from these points should not be difficult. Each additional toothbrush notch would require not less than ⅜ in. additional length of material for the shelf and a corresponding additional amount to the other horizontal members. Figure 2 shows a working drawing with a horizontal mass, and Figure 3 represents a similar problem having a vertical mass.

An appropriate finish for the toothbrush holder is white enamel or lacquer. Mahogany or walnut stain and transparent lacquer, or shellac and wax may also be used. Sand the problem between coats and rub to a smooth finish with powdered pumice and oil or water.

EASY METHOD FOR TEACHING ELECTRICAL DIRECT-CURRENT MATHEMATICS

Edward B. Flaherty, Warren-Bunker Hill District School, Boston, Mass.

During my teaching experience, I have found the following method easy and very instructive. The sixth and seventh grades are given direct-current power computations, that is, they are taught the use of the formula $W = E \times I$. This formula is not difficult to remember, but, if the voltage is required, when the wattage and amperage are given, a difficulty is met. The principles of algebra are not taught in these grades, hence the following method was devised. On the blackboard draw a circle, and draw a diameter horizontally. To this, then, draw a perpendicular downwards through its center as shown in Figure 1. Insert the letters *W*, *E*, and *I* as shown. In the preliminary explanation, emphasize that the horizontal diameter means the line of division. Thus ⅔ means that 2 has been divided into 3 equal parts. Also, that any numbers below this division line must be multiplied together, as for instance $7 \times 3 = 21$.

FIG. 1

FIG. 2

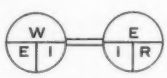


FIG. 3

Then the instructor is ready to "put over" the lesson. Cover *W* in Figure 1 and ask a pupil "How can you find the wattage?" when the volts and amperes are given. The answer is, "$W = E \times I$." Now cover *E* and ask another pupil "How can I find the volts?" when the watts and the amperes are given. The answer will be, "*W* divided by *I*." Lastly, cover *I* and ask "How can you obtain the amperes?" when the other two units are given. The reply given is, "*W* divided by *E*." Writing down these formulas we have,

$$W = E \times I;\ E = W \div I;\ I = W \div E.$$

Ohm's law is taught in the eighth grade, and the lesson is "put over" by the same method. Draw a similar diagram and insert the letters *E*, *I* and *R* as shown in Figure 2. By means of the same type of questions the formulas $E = I \times R$; $I = ER$; and $R = EI$ may be established.

After a week, link the two diagrams by two horizontal lines as shown in Figure 3. This arrangement may be called the "dumb-bell formula" because of its resemblance to a gym dumb-bell.

By this method any problem dealing with direct-current computations may be solved. This method has been used also in adult trade classes where the students had some knowledge of algebra.

FITTING HINGES

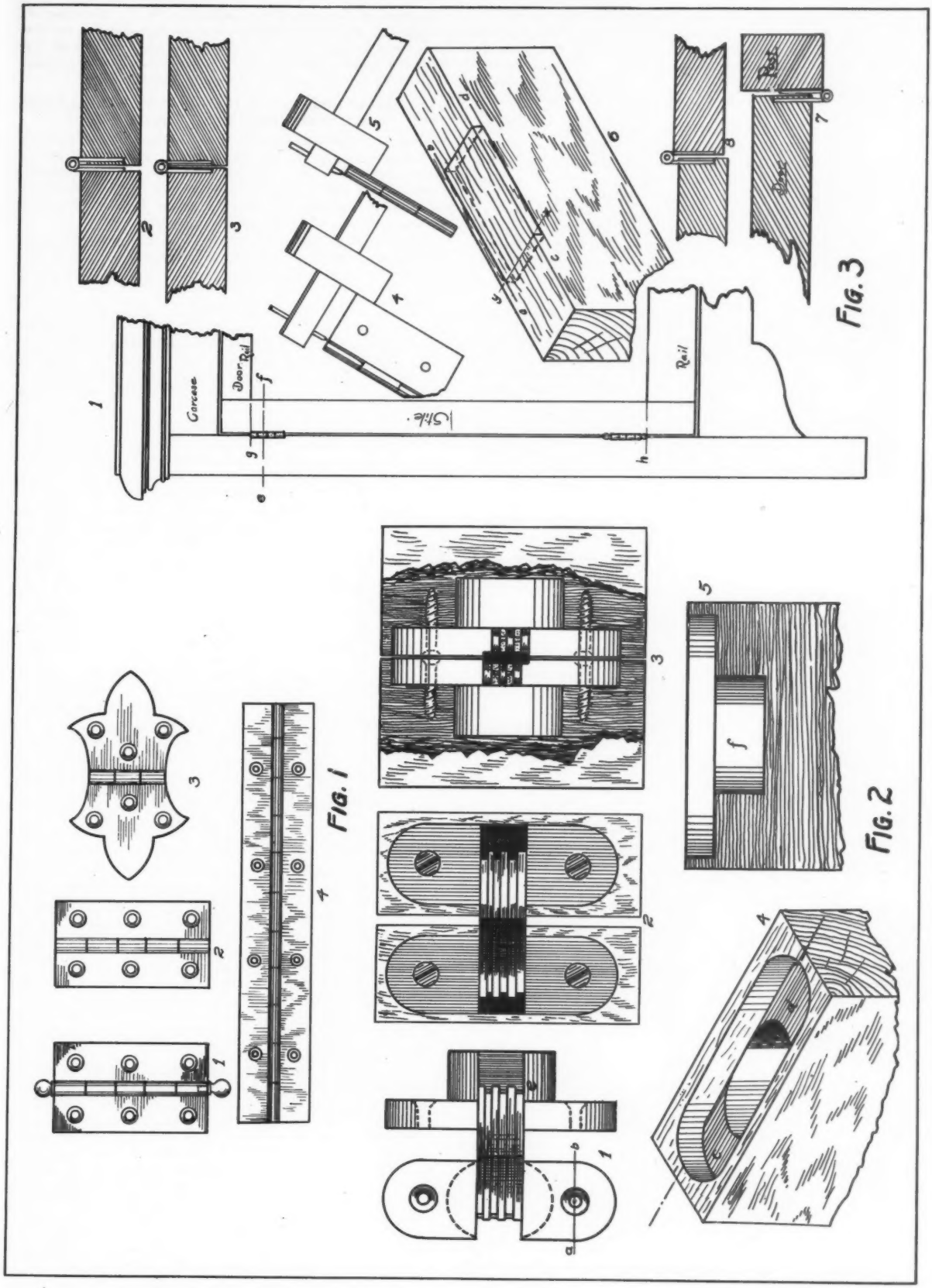
L. F. Hyatt, McKinley High School, Canton, Ohio

There are many types of hinges that are familiar to the cabinetmaker, some being adapted to one kind of cabinet and some to another. Figure 1 shows four kinds of hinges that are universally used. These are made in both iron and brass. The brass hinge is the one usually used in cabinetwork.

The fitting of hinges requires a considerable amount of skill. Much vigilance on the part of the instructor is necessary to prevent mistakes in fitting hinges, and many questions must be answered before the boy fully understands this work. Two kinds of butt hinges are shown in Figure 1. No. 1 is the loose-pin butt, and No. 2 shows the solid-pin butt. No. 3 is a surface hinge commonly called the "butterfly" hinge. This hinge comes in many styles, many of them elaborately ornamented. No. 4 shows a short piano hinge, used chiefly in phonograph and piano work. No. 1 in Figure 2 shows the Soss invisible hinge used wherever it is desirable to have the hinge completely concealed, such as in a spinet desk.

The first question which the instructor must answer is, "How far from the top and bottom of the door shall the hinge be placed?" To determine this, first clean and carefully fit the door. Then draw a line across the stile even with the edge of the top and bottom rails as shown at *g* and *h*, No. 1 in Figure 3. If the loose-pin hinge is used, the ball is placed even with the line as shown at *h*. Nothing will mar the beauty of a cabinet more than hinges placed several inches above or below the rails. After the line is marked across the stile, a square is placed upon the face of the door and the line *xy* is marked on the edge of the door as shown at 6, Figure 3. The marking gauge is set the width of the flap of the hinge, as at 4, and the line *ab*, as at 6, marked on the stile for both hinges. This mark gauges the distance for the cut at the back of the recess to receive the hinge. Any variation in the distance of these marks on the door and on the carcass will cause an uneveness in the surface of the carcass and door as shown at 8, Figure 3. The marking gauge is set slightly less than the thickness of the knuckle as shown at No. 5, Figure 3, and the line *cd*, gauging the depth of the recess to be made, is drawn. The hinge is placed even with the line *xy* and the line marking the length of the hinge is made with a knife. The wood is then removed and the hinges screwed in place. The work must be done very carefully and accurately. If the cut is made too deep, the hinge will bind, and if too shallow, the space between the door and carcass will be too wide. After the hinges have been screwed to the door, the door is placed in position and wedged up at the bottom until the clearance is sufficient and the top and bottom of each hinge marked. The distance on the carcass where the flap goes is marked as was done at *ab*, No. 6, Figure 3. The hinge is then held in position and a screw hole in each hinge is marked and bored and one screw driven. Never drive screws in wood, not even the softest, without first boring for the screws. After one screw is driven in each hinge, the door is swung shut and any unevenness can then be corrected by boring the holes a little higher or lower, or forward or backward as the case may be. The two screws that have already been driven are then released and the others driven first, correcting the inaccuracy, after which the first screws are again driven. These seldom move the door from position, even if driven in the holes that were originally bored. If both the carcass and door are to be recessed to receive the hinge flaps as shown at 3, Figure 3, the marking gauge is set a little less than half the thickness of the knuckle of the hinge, and the other steps in the work done as before. Nos. 2 and 3 show sections through *e* and *f*, Figure 3. In some cabinets the doors are fastened to a post as shown at 7, Figure 3, and to have sufficient material into which to drive the screws, the hinge is made with one flap wider than the other. For this kind of hinge, the recess is always made in the door, and the short flap fastened to the surface of the post, because to set the hinge in the post will mar the beauty of the cabinet. The surface or "butterfly" hinge, as it is sometimes called, is simply laid upon the surface and the holes in the door and carcass marked. The only difficulty is in getting them on square and in allowing the correct amount of space between the door stile and the carcass. The continuous hinge is not so common as the other three, but is used extensively in victorola and piano work. It is invariably fitted as shown at 3, Figure 3, that is, by setting the hinge in the top or lid only.

The Soss invisible hinge shown at 1, Figure 2, is always used where it is desirable to conceal the hinge. With a marking gauge, a line is made exactly in the center of the piece in which the hinge is to fit, and with a bit equal in diameter to the end of the hinge at *ab*, bore holes at *c* and *d*, being careful to place the spur of the bit on the center line previously drawn. Care must also be taken to place the bit that the recess is not cut too long for the hinge. The holes at *c* and *d* should be bored to a depth equal to the thickness of the hinge. The center is then bored to receive part *e* of the hinge. This must be accurately done so as to avoid any binding of the levers. The hinge is shown fastened in place at 2, Figure 2. Much is added to the



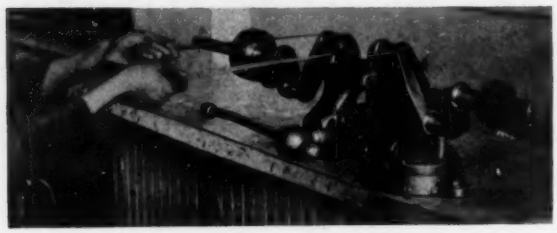
FITTING HINGES, L. F. HYATT, CANTON, OHIO

appearance of the work if the screws are turned so that the slots all slant the same way. This applies to all hinge fitting. At 3, Figure 2, the hinge is shown, with sections of the wood removed to show the position of the hinge when the door is closed. The most common error in fitting this particular hinge is in cutting *c* and *d* at No. 4, to different depths, and in having the recess *f*, shown at No. 5, too shallow.

RIDGES ON THE CRANKSHAFT

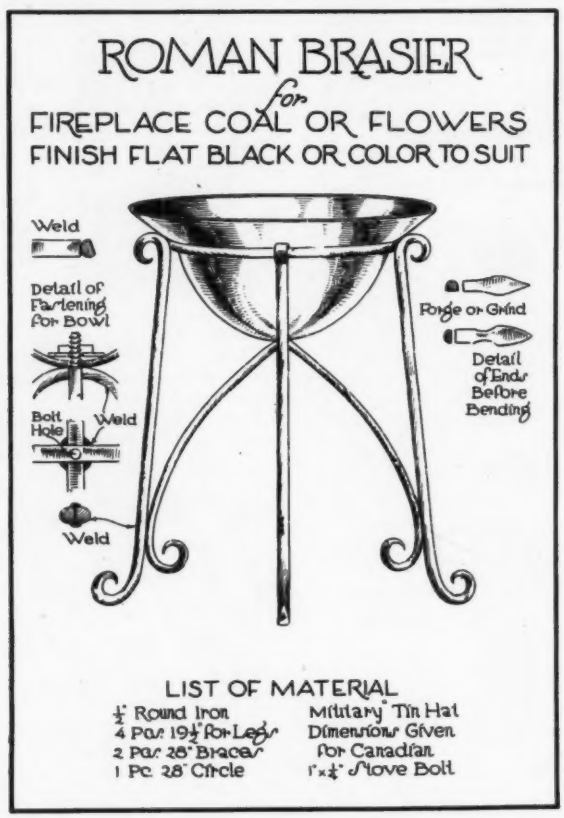
Ray F. Kuns, Cincinnati, Ohio

After long service, the wear on crankshaft journals and crank pins will be noticeable in the form of slight ridges or grooves. The foreign particles of grit, metal, and other abrasive materials which find their way into the crankcase eventually find their way into the bearings. It is these particles which produce the scratches or scores. Then, too, there are those bearings which have oil grooves running entirely around on the inside of them. These cause a ridge to form within the groove as the shaft turns around in the bearing.



POLISHING OUT RIDGES AND SCORES

Whatever the cause, the ridges must be removed when the bearings are refitted. If the ridges are very pronounced, they may be removed with a fine-cut file, carefully used with a rounding stroke, taking care to smooth off the ridge just to its base. Then the polishing is performed as shown in the picture. A long strip of emery cloth is used and passed one full turn around the shaft. This strip is drawn forth and back until all the fine ridges or scratches are polished out.



ROMAN BRASIER, DESIGNED BY C. O. GREENLEAF, SARNIA, ONT., CANADA

A fine grade of cloth is used, not coarser than No. ½. Some mechanics use a strip of the cloth just as wide as the journal or pin and then pass a heavy cord around it, using the cord to rotate the strip of cloth which is wrapped around the pin. The cloth should be long enough to give from 1 to 1½ turns on the pin or journal.

CHEAP SOAP AND CLEAN HANDS FOR SHOP CLASSES

Carl J. Orness, High School, Lincoln, Nebr.

Removing dirt and grease from the students' hands quickly at the end of a shop period has always been a rather difficult and expensive problem for the school shop. I have tried the following methods in the auto shop at the high school in Lincoln, and the last one solved the problem for me. The school furnishes liquid soap which is used with all of the methods described.

First Method. Liquid soap alone will not cut grease so bar soap was furnished, which was a pumice and tar combination. For 80 boys, three bars were used daily. This was not satisfactory and cost a great deal.

Second Method. Each boy provided his own "mechanic's soap." This cost the student about 30 cents a semester. Much time was wasted going to his locker for soap every day and the lockers soon became badly smeared opening them with greasy hands. The boys complained because of the expense, waste of time, and confusion, to say nothing of the grease spots put on clothes in the lockers by the soap cans, etc.

Third Method. A basin of coal and motor oil mixed was placed near the sink. Rubbing the hands first in this solution and then washing with liquid soap and water provided a better cleaning combination, but the shop floor around the basin soon became spotted and some of the more careless boys would splatter it on the clothes of others.

Fourth Method. The plan now in use makes the expense almost nil. A basin near the sink is half filled with fine sawdust (the finer the better) slightly moistened with coal oil. Rubbing this on the hands first and washing with liquid soap and water removes the grease and dirt and leaves the hands clean and soft. The mixture is not messy, does not spot the floor or clothes unless it is almost dripping wet with oil, and most important of all, it saves time. Our clean-up period has been shortened three minutes since adopting this method and we have had no complaints from "classroom teachers" because of dirty hands of students coming from shop classes.

I am using an old Buick oil pan set into a small table top for the sawdust basin. This is placed out on the floor in order that six students can get around it at once. The sawdust is renewed every four weeks. Last year I used approximately 12 gallon measures full of sawdust and 1½ gallons of coal oil. This mixture works best if the sawdust is real fine and only slightly moistened with the oil. A coarse sawdust may cause some difficulty in the sink drain although I have never had such an experience. When the pan is not in use it should be covered to cut down the fire hazard.

COMBINATION RADIO CABINET AND BOOKCASE

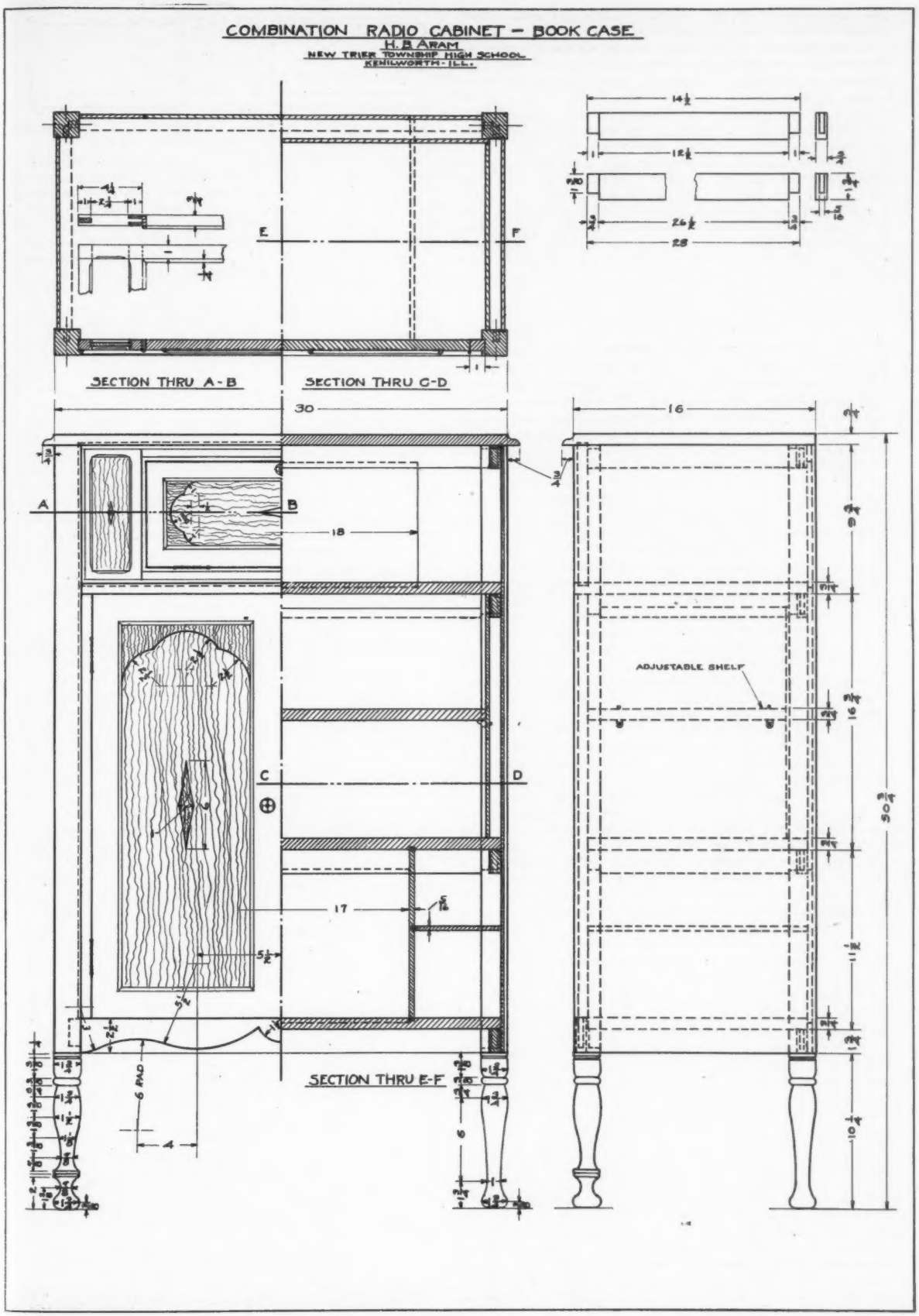
H. B. Aram, New Frier High School, Kenilworth, Ill.

This combination radio cabinet and bookcase makes a very desirable and attractive piece of furniture. It is built for an Atwater Kent receiving set with an A and B battery system, but may also be used for the other makes of radio sets.

It is a strongly built piece, the framework being fastened together with mortise-and-tenon joints, glued and pinned. The shelves are set on top of the crossrails and securely fastened with screws. The legs are grooved to take the side panels as shown in the illustration. This groove should be large enough to allow the panels to slide in freely after the frame has been assembled. The front legs are also grooved to take the ¾ by 1-in. hinge strip for the double doors and the ¾-in. framework above.

The upper compartment is designed to accommodate the receiving set and is large enough to allow storage space for radio literature, etc. The front of this compartment is made up of a frame with the door in the center and a small panel set in a groove on each side. These panels are of ¼-in. plywood and are put in place when the frame is assembled. The inside framework around these panels is chamfered slightly and a small diamond-shaped piece is glued to the center of the panel. A small ¼-in. molding extends all around the outer edge of the upper compartment frame. The door opening is 7 by 18 in. It is trimmed with a ⅞ by ¼-in. strip, rounded at the outer edge to form a bead around the door. The door is hinged below so that it may be opened to a horizontal position and used as a writing shelf. A small support at the right holds the door in an open position.

The lower compartment is for the batteries. The pigeonholes, one on each side, are very convenient for filing purposes. Enough


COMBINATION RADIO CABINET – BOOK CASE
H. B. ARAM
NEW TRIER TOWNSHIP HIGH SCHOOL
KENILWORTH - ILL.
SECTION THRU A-B
SECTION THRU C-D
SECTION THRU E-F
ADJUSTABLE SHELF
30
16
18
17
A
B
C
D
E
F

holes should be bored through the floor and back door of the battery inclosure to permit perfect ventilation.

A novel feature of this cabinet are the adjustable bookshelves. These occupying the available space between the upper and lower compartments, not only serving a decorative purpose, but also helping to eliminate the buzz which is sometimes caused by the proximity of the battery to the receiving set. The inside of the book compartment is lined with ¼-in. plywood, leaving an air space through which the wires from the receiving set to the batteries may be passed.

The doors are made of solid pieces with splines in the ends to prevent warping or splitting. As shown in the drawing, a small bead is set 1¾ in. from the outer edge of the double doors and 1¼ in. from the outer edge of the single door. A veneer of walnut is glued to the doors at each end and a diamond-shaped piece in the center. These features add greatly to the appearance of the doors. The cabinet is made of mahogany, with the exception of the shelves which are poplar, edged with mahogany, the veneered corners, the diamonds on the doors, and the partitions for the pigeonholes.

MAKING PANELED GREETING CARDS IN THE SCHOOL PRINTSHOP

M. J. Haessly, Milwaukee, Wis.

Now that the holiday season is close at hand, the school printshop undoubtedly will be called upon to produce a vast variety of greeting cards, some to be on a plain white card with an appropriate sentiment printed in black, others quite elaborate, with two, three, and perhaps four colors with the sentiment inclosed in a neat panel to properly portray the spirit of the season.

Oftentimes there is a keen desire on the part of the boys in the printshop to produce a job of paneling, but the question of how to make the proper dies has always been a stumbling-block. However, after considerable experimenting on the part of the writer, the problem of producing satisfactory dies at very little cost has been solved.

Making the Die

After deciding upon the size of the panel to be made, the next step is to prepare the die, which is not as complicated as may at first seem, and requires very little skill on the part of the one making it.

Select a sheet of stiff cardboard, about 6 ply in thickness. Cut a piece from this sheet about twice the size selected for the panel. With a pencil and ruler, mark the size of the panel in the center of the piece of cardboard. Have a good sharp knife at hand with which to do the cutting. Hold the knife at an angle of about 45 deg. toward the center of the stock, and with a steady hand, cut out the panel. When the cutting is completed, the piece in the center is called the "male" die, and the balance of the stock from which it was cut is called the "female" die. Should the cutting be a little crooked or wavy on the first trial, repeat the cutting process until a perfect die is produced.

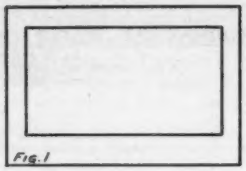
Mounting the Die

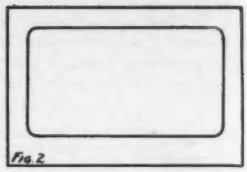
The next step is to mount the male die on a type-high block, preferably hardwood, which may be prepared in the woodworking department. This type-high block is to be about ¼ in. larger on each side than the dimensions of the male die. The reason for this extra ¼ in. will be explained later. Keep the dies together in the same position as they were before they were cut, as the bevels on the dies must always mesh or it will be impossible to make a perfect panel. Remove the male die and place it on a sheet of paper keeping the beveled edges down at all times and spread a film of Le Page's glue on it. Now place it on the block making sure that it is on straight, then place the block between two boards and clamp them together until the glue has thoroughly dried. This completes the mounting of the male die.

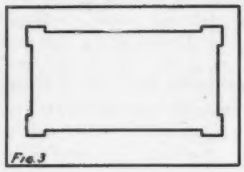
Make-Ready on the Press

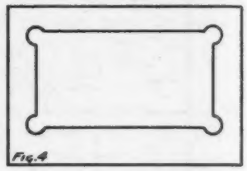
Prepare a make-ready as for a regular job of printing. Lock the male die in the center of the chase as you would an ordinary type form. Remove the rollers from the press and put in the chase. Lock the chase so it cannot move one way or another. Should the chase move while the paneling is being done, the dies will be spoiled. Put a little daub of glue on each corner of the male die block and fit the female die over the male die. The daubs of glue will hold the female die firmly in place. Before doing this, however, the female die should have a thin film of glue on the side that is to be glued to the tympan. With the two dies in the position described in the foregoing, move the flywheel slowly by hand until it is up to the point of impression, and let it remain there for a few minutes. Now run the press off the impression slowly, making sure that the female die adheres firmly to the tympan. Stretch a sheet of ordinary white paper that has a smooth surface over the tympan and clamp it firmly in place by opening first the bottom bale, then the top bale. This will assist in keeping the female die in place, and also furnishes a place in which to set the gauge pins. Use a rag and some gasoline to remove any glue adhering to the block. Chamfer the edges of the block a little with a sharp chisel to prevent the edges from sinking into the stock which is to be paneled. Register one of the cards to be paneled the same as for an ordinary job of printing. When the pins are properly set, seal them down with sealing wax, and proceed with the paneling, first trying out on some blank pieces of cardboard to see if the paneling is O.K., before starting to run the stock on which the paneling is to be done.

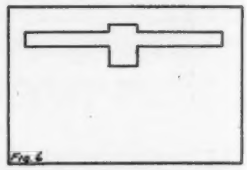
Figures 1 to 6 offer some suggestions for panels.











RIMES BY A CARPENTER

A. E. Gray, Stockbridge, Mass.

The world is filled with music
Sweet and charming to the ear,
Lilt of bird and song of human
Fill the gloomy heart with cheer;
But to me there is no music
So entrancingly the same
As the swishing sound that issues
When I'm pushing my old plane.

There are cultivated voices,
Prima donnas coloratur,
Harps and viols and lutes of wonder
That inspire and throb and lure;
But to me the Pipes of Pan
And all the rest do naught but fail
When I'm listening to my hammer
Ringing true upon a nail.

There are bands with martial music
That expand and thrill the soul;
And choirs with heavenly splendor
Make the mighty echoes roll;
There are thrilling, warlike bagpipes
Bringing loud the clash of sword,
But they sink to mere oblivion
When I'm sawing through a board.

Let the silver trumpets tremolo,
Let the golden-throated sing;
Arpeggios, keys, and motifs
Of course are quite the thing;
But I still affirm with vigor
Though I'm classed the king of fools,
There's a soul-expanding charm
About the music of my tools.

THE SCHOOL-CRAFTS CLUB MEETING

The School-Crafts Club of New York City held its first meeting of the year on October 19, at the Geneva Club, 144 West 43rd Street, New York City. A dinner was served to the members at 6:15 p.m., which was followed by a discussion of plans for the coming year. A fine program was outlined, which was both educational and enjoyable in character.

Mr. Hemion, president of the club, introduced the first speaker of the evening, Mr. George C. Young, instructor in the Emerson High School at Union City, N. J., who took for his subject "Mechanical Drawing as Related to the Junior and Senior High Schools." Mr. Young said this subject is offered in his school to pupils of the seventh to twelfth grades. He displayed some of the work of his students, showing the wonderful progress made by them as they advanced in the work.

Mr. Fred Arnold, instructor in the Evander Childs High School of New York City, who was the second speaker, talked on "Mechanical Drawing in the High Schools," stressing the fact that mechanical-drawing curriculums should be flexible. He urged that a student be permitted to advance as rapidly as his ability permits. A distinction should be made between the college preparatory group and the boy entering the industry, since the aim is mainly cultural for the college student, and mainly practical for the industrial student. For the latter student, the aim should be to secure such drawings as the boy may apply to any object he is constructing in the shop. In the Childs High School, Mr. Arnold begins with free-hand sketching, later advancing into isometric drawing. Stress is laid upon the ability to read drawings rather than the making of perfect ones. In general, the student who is taking drafting for vocational purposes should be trained to exactness. In general, it is noted that comparatively few boys have real talent in drawing, so that isometric drawing aids them in visualizing and reading intelligently. Lettering problems should be introduced as needed and not simply for practice.

The meeting adjourned at 10:45 p.m.—*Harry S. Fletcher.*

VOCATIONAL TEACHER-TRAINING SECTION OF THE A. V. A. TO MEET AT PHILADELPHIA

The vocational teacher-training section will hold a meeting in connection with the convention of the American Vocational Association, on December 13 to 15, at Philadelphia, Pa. Mr. R. H. Rodgers, chief of the division of vocational teacher-training and research, at the Milwaukee Vocational School, will be in charge.

The first session will be in charge of Dr. George E. Myers of the University of Michigan. Mr. Benjamin W. Johnson, assistant director of the division of vocational education of the University of California, will open the meeting with a talk on "The Selection of Tradesmen for Training as Vocational Teachers"; Mr. E. D. Fink, supervisor of industrial teacher-training of the New York State Education Department, will discuss "The New York Scholarship Plan as a Means of Securing Qualified Vocational Teachers"; and Dr. David Snedden of Teachers College, Columbia University, will take as his subject "The Essentials of a Professional Curriculum for the Preparation of Vocational Teachers."

At the second session, Mr. F. T. Struck, head of the department of industrial education of the Pennsylvania State College, will be in charge. Mr. K. G. Smith, state supervisor of industrial education for Michigan, will open the meeting with a talk on "The Evaluation of the Michigan Plan in the Certificating and Licensing of Vocational Teachers"; Mr. Oakley Furney, chief of the industrial education bureau of the New York State Education Department, will discuss "The Evaluation of the New York Plan of Certificating and Licensing of Vocational Teachers, Supervisors, and Directors"; Mr. C. C. Sargent, state director of vocational education in Colorado, will take for his subject "The Colorado Plan of Evaluating Vocational Experiences for Teachers' Credentials"; and Mr. Frank Cushman, chief of the trade and industrial-education service of the Federal Board for Vocational Education, will discuss "Standards as a Part of the State Plan of Certification and Licensing of Vocational Teachers."

At the third session, Mr. Charles W. Sylvester, director of vocational education at Baltimore, Md., will be in charge. Dr. Walter B. Jones, research professor of education at the University of Pittsburgh, will talk on "Developing a Program of Summer School Professional Work in Terms of the Needs of Vocational Teachers"; Mr. Thomas H. Quigley, of the industrial-education department at the Georgia Institute of Technology, will discuss "The Preparation of Leaders for Professional Education in Service"; and Dr. Franklin J. Keller, of the East Side Continuation School, New York City, will take up the subject, "The Organization of a Program of Professional Education for Vocational Teachers in Service."

THE PRESIDENT OF THE AMERICAN VOCATIONAL ASSOCIATION INVITES YOU

As President of the American Vocational Association, I wish to pass on to the readers of the INDUSTRIAL-ARTS MAGAZINE the impressions which I have received by visiting various sections of the country and also from the correspondence that comes into my office.

I can only continue with increased assurance the optimistic strain expressed in my comments in the August, A. V. A. Bulletin. Everywhere there are indications of greater initiative and eagerness for the work, locally, as well as increased enthusiasm for the A. V. A. With confidence I can say that the membership of our association will reach a number never equaled heretofore.

Evidently, the fact that the Association renders a personal service to its membership is being recognized. All are profiting from the conditions which the A. V. A. is helping to establish and it is seen that the services of the Association are not measured by the mere program at its convention, nor by the printed material that is being sent out.

It is contributing greatly toward the extension of teaching service into areas heretofore unaffected, and is widening the opportunities of teachers by so doing. It is stimulating the type of activity back home which means local initiative, research, and study, clarifying of objectives, and profiting by one another's experiences. It is hastening the study of better remuneration and gives added security in employment.

Doubt and uncertainty is disappearing. The fate of individual teachers, their remuneration and recognition is involved in the success of the Association, and the Association is entitled to the support of the individual teachers.

As President, I wish to take this occasion to thank you who are out in the field and who are so efficiently presenting the viewpoint of the Association, and to congratulate you upon the success attending your efforts.

As President, I also heartily invite you to the coming convention at Philadelphia, December 13, 14, and 15, knowing that the program arranged for this occasion will more than repay you for the trouble and expense which your attendance will cause you personally.

R. L. COOLEY, President,
American Vocational Association.

DECORATING INSTRUCTORS' CONFERENCE

A decorating instructors' conference will be held in connection with the national convention of the American Vocational Association, to be held December 13 to 15 at Philadelphia, Pa. In addition to the discussions there will be demonstration sales, exhibits, and visits to local wallpaper plants.

Among the speakers at the conference will be Mr. R. T. Craigo, assistant director of Dunwoody Institute, Minneapolis, Minn.; Mr. Harvey L. Freeland, state supervisor of trade and industrial education of Lincoln, Nebr.; Mr. N. S. Hundson of Texas; and Mr. E. J. Hickey of Boston, Mass. Other prominent men who will be present and contribute to the meeting are Mr. Clarence T. McKee of Pittsburgh, Pa.; Mr. E. N. Walsh of New Haven, Conn.; Mr. J. A. Seguin of Philadelphia, Pa.; Mr. J. E. Isenhart of York, Pa.

THE ILLINOIS CONVENTION

The third annual convention of the Illinois Society for Vocational and Practical Arts Education was held on October 12 and 13, 1928, at the LaSalle Hotel, Chicago, Ill. The meetings, both general and sectional, from the very first one on Friday morning to the last one Saturday afternoon, were well attended.

It is significant that sectional meetings were held for the home-economics groups, industrial-education groups, art-education groups, commercial-education groups, part-time-education groups, personnel and guidance groups, and for the printing groups.

The Illinois Society not only attempted but succeeded in giving each of these groups something specific, some pertaining to their own particular work. The response of the membership was therefore what might be expected. Anyone who attended the meetings and witnessed the earnestness and enthusiasm of these Illinois teachers, was not surprised to learn that the membership is close to the 900 mark. The impressions obtained at the general and sectional meetings were strengthened when these same teachers were observed in the hall where the commercial exhibits were held. No doubt the exhibitors were gratified by the interest and attention with which everything that they showed was studied.

The annual banquet on Friday evening also was well attended and after a very pleasant get-together dinner at which the corporial needs of those who attended were well taken care of, the eminent speakers who had been asked to address those present finished off the occasion with a veritable feast of reason. It would be a huge task to try and portray all of the good things that were said at the various meetings, especially since the program was given at some length in the November issue of the INDUSTRIAL-ARTS MAGAZINE. The new officers will find it a difficult matter to surpass what was accomplished at this convention, although the names of those who have been elected to guide the Illinois Society for Vocational and Practical Arts Education for the coming year, augur well for an equally successful convention next year.

President Albert W. Evans and the other officers and committees that assisted him are to be congratulated upon the showing which they made.

At the annual business meeting held on Saturday morning at 9:30, the following officers were elected for the coming year: President, Albert F. Siepert, dean of education, Bradley Polytechnic Institute, Peoria; secretary, C. C. Willard, principal of Wendall Phillips High School, Chicago; treasurer, N. F. Fultz, vocational director, Morton Township High School, Cicero; vice-president: for agricultural education, E. J. Tobin, superintendent of schools, Cook county; for art education, Lucy Silke, director of art education, Chicago; for commercial education, Benjamin J. Knaus, director of commercial work, Chicago; for home-economics education, Dora Wills, president of Lucy Flower Technical High School; for industrial education, Drew W. Castle, vocational director, Joliet Township High School and Junior College, Joliet; for part-time education, C. A. Unnewehr, Washburne Trade and Continuation School, Chicago; for personnel and guidance, Anne Davis, director of vocational guidance, Chicago. The board of directors fo three years, consists of all of the officers listed in the foregoing, and the following elected members: Grant Beebe, principal of Lane Technical High School; C. L. Gordon, assistant principal in charge of vocational education, Waukegan High School. The executive committee will consist of Pres. A. W. Evans, principal Tilden Technical High School, J. F. Kolb, state supervisor of industrial education, Springfield; Urban J. Willis, principal, Pullman Free School of Manual Training; L. Day Perry, Lane Technical High School; and Arthur B. Mays, University of Illinois, Urbana.

INDUSTRIAL-ARTS MEETING AT PITTSBURGH

The fall meeting of the industrial-arts teachers of Pittsburgh and vicinity was held on Saturday, October 30, at the Schenley High School, Pittsburgh, Pa. About eighty industrial-arts teachers were in attendance.

Mr. S. L. Coover of Beaver Falls, Pa., gave the opening address of the meeting, speaking on the fundamental requirements for school-shop projects. Mr. Coover displayed photographs and blue prints of projects made in his shop, also a panel showing parts used in making an electric motor.

Mrs. Cowley talked on the work done at the north side playground during the summer and the assistance given by the industrial-arts teachers.

Mr. Paul Cressman of the state education department took up the subject, "Looking Forward in Vocational Education," tracing the progress made in industrial arts and the part which vocational guidance plays in the educational plan. At present there are 45 different trade courses offered. Mr. Cressman predicted that industrial-arts courses of the future will consist of short-unit courses, and that new trades, such as paper hanging and plastering, will be added to the list of courses now offered.

At the close of the meeting, a short business session was held with election of officers. Mr. Fox was elected president, and Mr. Wolf secretary.—*George C. Donson.*

THE TULSA MANUAL-ARTS CLUB MEETS

The first meeting of the Tulsa Manual-Arts Club for the school year 1928-29 was held at the home of Mr. E. O. Weger, an instructor at the Woodrow Wilson Junior High School. The meeting was a social affair for the members of the staff and their wives.

A second meeting was held at the El Patio Tea Room on October 26, under the direction of Mr. W. W. Graham, an instructor at the Central High School.

Following the dinner, Mr. B. W. Hargis, of the Lowell Junior High School, described his travels over the country during the past summer. Mr. Hargis told of his visits to 22 states, mainly in the eastern part of the country, stopping at such important places as Washington, D. C., Mount Vernon, New York City, Boston, Niagara Falls, Detroit, and Chicago.

Mr. O. B. Badger, director of vocational education, spoke on the topic, "When should vocational education begin?" Mr. Badger held it is necessary to take into consideration the mentality of pupils in vocational education. Pupils having a high degree of mentality should defer making their vocational choice to a late age, about 20 to 22 years. Pupils of average mentality with a more limited range of vocational choice should make their choice early, while pupils of low mentality with a very limited range of choice, should leave school as soon as the law permits, since they do not gain anything from further school attendance. Mr. Badger pointed out that there are four recognized types of mentality, i.e., the literary, the mechanical, the social, and a composite type, which should be taken into consideration in arriving at a vocational choice. Other considerations which affect the time of vocational choice are the physique of the individual, the occupational opportunity at different ages, and the economic ability of the student to advance his own education. He pointed out that future development should bring about a greater amount of part-time education and cooperative education in connection with the industries, the need of this being clearly evident in the enrollment of the ninth grade, which is always much less than that in the second or third grade. The discrepancy is attributed to the fact that large numbers of pupils in the ninth grade enter industry and they can be reached by no other educational agency.

A letter was read from Dr. W. T. Bawden, formerly associate superintendent of schools in Tulsa, in which Dr. Bawden acknowledged his appointment to life membership in the club. Dr. Bawden is now supporting a movement for the organization of a similar club at Peoria, Ill.—*J. W. Bollinger.*

THE MANUAL-ARTS CONFERENCE AT ST. LOUIS

The nineteenth manual-arts conference will be held December 6 to 8, at the Hotel Missouri, St. Louis, Mo. Representatives of fourteen states will be present at the conference.

At the first session, Mr. O. H. Day of Kansas City, Mo., will be the chairman. The topic for discussion will be "Problems in Shop Planning and Equipment for Teachers."

At the second session on the first day, Mr. Homer J. Smith of the University of Minnesota will act as chairman. The topic for discussion will be "The Place of Manual Arts in the Senior High School." The third meeting will be in charge of Mr. John J. Metz, editor of the INDUSTRIAL-ARTS MAGAZINE, and will take up the topic, "Manual-Arts Standards for the Junior High School."

On the second day, Mr. William E. Roberts of Cleveland, Ohio, will be in charge of the meeting. The topic for discussion will be "Analysis of the General Shop Plan of Organization." The second meeting of the day will be in charge of Mr. C. S. Van Deusen of the State Teachers' College at Kent, Ohio, and will take up the topic, "Manual Activities in the Elementary School." Mr. J. F. Kolb of the state education department at Springfield, Ill., will be in charge of the third meeting, which will take up "The Reorganization of Methods for the Larger Cities."

On the third day, Mr. W. H. Stone of the Ohio State University will be in charge of the first meeting, taking up the topic of "Methods and Devices for Handling Tools and Supplies."

Following this meeting there will be a business session and a summary of the discussions by Mr. Charles A. Bennett of Peoria, Ill.

TEXAS INDUSTRIAL-ARTS TEACHERS TO HOLD MEETING

The Texas industrial-arts teachers will hold their annual meeting on November 30 at San Antonio. Among the speakers of the first session are Mr. L. W. Fox of San Antonio, who will give a talk on "Methods, Procedure of Teaching, and Organization of Industrial Arts"; Mr. Victor J. Smith of El Paso, will discuss "The Meaning of Tests and Measurements in Industrial Arts"; Mr. J. F. Kimball of Dallas will take for his subject "The Contribution of Industrial Arts to Higher Technical Education"; Mr. L. D. Kenton, of Commerce, and Mr. D. H. Sherrill, San Antonio, will talk on "Standards in Mechanical Drawing as Part of the Industrial-Arts Program"; Mr. H. J. P. Vitz, Denton, will discuss "Visual Education in Industrial Arts for the Junior and Senior High Schools and the Junior College"; Mr. Raymond Alsup, San Antonio, will take up the subject "The Aims and Possibilities of Architectural Drawing in the High Schools."

At the second session, Mr. Denman Kelly of Dallas, will talk on "The New Technical High School a Turning Point in Dallas"; Mr. L. H. Dennis of Harrisburg, Pa., will discuss "The Relation of Industrial Arts to Trade and Industrial Courses"; Supt. A. H. Hughey, El Paso, will take the subject "How to Measure a Vocational-Education Program in the Community"; and Dr. Crampton

of the Dallas Street Railway Co., will give a talk on "The Problem of Coordinating Between School and Industry."

Industrial Education Section

Place of Meeting: Main Avenue High School.
Time of Meeting: Friday Morning, November 30, at 9 a.m.
Chairman, E. L. Williams, A. and M. College, College Station.

General Joint Session

1. "The New Technical High School, a Turning Point in Dallas Secondary Education."—Denman Kelly, Principal, Dallas Technical High School.
2. Questions and Discussion.
3. "Why San Antonio Supports Industrial Courses."—Marshall Johnson, Superintendent of Schools, San Antonio.
4. Questions and Discussion.
5. "The Relation of Industrial Arts to Trade and Industrial Courses."—L. H. Dennis, Deputy State Supt. of Public Instruction, Pennsylvania.
6. Business Meeting Texas Vocational Association.

Trade and Industrial Section

Afternoon Session

Place of Meeting: Main Avenue High School.
Time of Meeting: Friday, November 30, at 1:30 p.m.
Chairman: Chas. A. Johnson, Houston.

1. "How to Measure a Vocational-Education Program in the Community."—Supt. A. H. Hughey, El Paso.
2. Questions and Discussion.
3. "What Industry Expects of the Boy Trained in a Vocational School."—(Speaker to be Secured.)
4. Questions and Discussion.
5. "The Problem of Coordinating Between School and Industry."—Dr. Crampton of the Dallas Street Railway Co.
6. Questions and Discussion.

Industrial-Arts Section

Place of Meeting: Main Avenue High School.
Time of Meeting: Friday, November 30, 1:30 to 3:00 p. m.
Chairman: Geo. W. Kibler, State Teachers College, Commerce.

1. "Methods, Procedure of Teaching, and Organization of Industrial Arts in San Antonio."—Mr. L. W. Fox, San Antonio.
2. "What Tests and Measurements Mean in Industrial Arts and How New-Type Tests May be Applied to Industrial-Arts Subjects."—Mr. Victor J. Smith, El Paso.
3. "The Contribution of Industrial Arts to Higher Technical Education."—Dr. J. F. Kimball, Dallas.
4. "Standards in Mechanical Drawing as Part of the Industrial-Arts Program":
   a) From the Standpoint of Training Teachers of Industrial Arts.—L. D. Kenton, Commerce;
   b) From the Standpoint of the Junior-High-School Industrial Arts.—Dick H. Sherrill, San Antonio.
5. "What Visual Education Means to Industrial Arts in the Junior High School, the Senior High School, and the Junior College."—Hugo J. P. Vitz, Denton.
6. "The Aims and Possibilities of Architectural Drawing in High Schools."—Raymond Alsup, San Antonio.

Pre-Convention Industrial-Arts Conference

Place of Meeting: Main Avenue High School.
Time of Meeting: Thursday, November 29, at 2 p.m.
Temporary Chairman: Victor J. Smith.

This is the second annual conference of supervisors, teacher-trainers, or others who may be interested in a more intimate round-table discussion of industrial-arts methods and problems than is possible during the general program.

INDUSTRIAL-ARTS TEACHERS OF NORTHEASTERN OKLAHOMA MEET AT MUSKOGEE

The industrial-arts teachers of northeastern Oklahoma held their annual meeting October 18 to 20 at Muskogee, Okla.

Mr. R. V. Lulow discussed the subject, "Effect of Routine Organization on the Teacher's Load," pointing out that some means are necessary for lifting the teachers' load, thus giving more time for actual teaching. In order to free the teacher from routine details, during class time, it was recommended that teachers make use of class projects in teaching beginners; that they use instruction sheets wherever possible; that they appoint foremen for jobs such as machine work or assembling; that they provide a definite place for recording future needs; that they appoint a student secretary for attendance reports; that they keep models of difficult construction on hand; that they follow a definite system in checking pupils' work; that they provide for the grouping of pupils of like accomplishments; that they use progress charts for maintaining the interest of pupils in the work; that they appoint a toolworker with definite instruction for handling the job; and that they learn when to say "no" as well as "yes" when a new project is offered to shop classes.

Mr. O. B. Badger, supervisor of manual arts at Tulsa, talked on the subject of "Effective Teaching of Shop and Drawing Classes." Mr. Badger stressed two important points, namely, giving the pupil opportunity for thinking about the work performed, and getting the maximum amount of work done within a definite time limit.

The meeting then divided into sections for the discussion of problems of particular interest. The woodworking section was led by Mr. E. L. Southard of Sand Springs; that on mechanical drawing by Mr. C. S. Washburn of Tulsa; that on metal work by Mr. J. T. Huckstep; and that on electricity by Mr. E. U. Opfell of Okmulgee.

At the business session, the following officers were elected for 1929: President, Mr. O. B. Badger, Tulsa; vice-president, Mr. R. A. Wells, Okmulgee; secretary-treasurer, Mr. E. U. Opfell.—*J. W. Bollinger.*

MISSOURI VOCATIONAL TEACHERS HOLD MEETING

The Missouri Vocational Teachers' Association held a meeting on November 14, 15, and 16, at the Lathrop Trade School, Kansas City, Mo. Mr. George W. Reavis, state director of vocational education at Jefferson City, acted as chairman of the meeting.

The meeting was opened by Mr. O. H. Day, director of vocational education at Kansas City, who talked on the subject "What the Smith-Hughes Law Means to Trade Education"; Mr. T. E. Spencer, director of reference and research in Kansas City, discussed "The Characteristics of Efficient Vocational Education"; Miss Ella Moore, state supervisor of vocational home economics at Jefferson City, took up the subject "Home-Economics Education for Adults"; Mr. R. T. Wright, president of the vocational agriculture teachers of Missouri, talked on the subject "How the Vocational Agriculture Teacher Can Best Serve His Community"; Miss Adelaide Baylor, director of home-economics education for the Federal Board for Vocational Education, discussed "The Home-Economics Outlook"; and Mr. G. E. James, state supervisor of agricultural education, talked on "Vocational Training for Future Farmers."

The meeting closed with a vocational-education banquet and a business session at the Hotel Savoy.

OKLAHOMA CITY TEACHERS ORGANIZE VOCATIONAL CLUB

The Oklahoma City industrial-arts and vocational teachers have organized a club, which is known as the Oklahoma City Industrial Education Club. The club is both a social and improvement organization.

The officers of the club are: President, Mr. H. F. Rusch; vice-president, Mr. Claude Keenan; secretary-treasurer, Mr. Paul Bell.

The meetings of the club are held regularly once each month.

ANNUAL DINNER OF THE MINNESOTA VOCATIONAL ASSOCIATION

The second annual dinner of the Minnesota Vocational Association was held on November 9, at the Y.M.C.A. banquet room, Minneapolis, Minn. The meeting was devoted to addresses and brief reports on the Los Angeles meeting. Mr. Robert H. Rodgers, of the Milwaukee Vocational School, Milwaukee, Wis., talked on the subject, "The Training of Teachers in Service"; Mrs. Anna L. Burdick, an agent of the Federal Board for Vocational Education in Washington, discussed the topic, "Girls and Women in Trades and Industry."

MODEL OF $12,000 HOME BUILT ONE-FOURTH SIZE BY CARPENTER APPRENTICES AT THE EVENING BOYS' VOCATIONAL SCHOOL ELIZABETH, N. J., MARTIN J. CORCORAN, DIRECTOR

NOW, ARE THERE ANY QUESTIONS?

Industrial-Arts Club

830. Q.: Can you furnish me with a program of activities for an industrial-arts club that can be followed by the members of an industrial-arts club consisting of junior-high-school boys?—*C. T.*

A.: The State Department of Education, Salem, Oreg., publishes a pamphlet entitled "Industrial Club Work of Oregon Boys and Girls" which you may find interesting.

A worth-while project for such a club might be the building of bird houses for the public parks. The article on "A Coverall Club as a Preventive Agency," page 278 of the August, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE, may also give you valuable information.

Soldering Tables

835. Q.: We are building a table for our shop on which we wish to place our gas furnaces and do our soldering. I would like to know what kind of top or top cover to which solder will not adhere and will be acid proof. Can a ledge be placed around the top and a substance similar to concrete be used?—*H. L. H.*

A.: After trying out many types of top materials for sheet-metal workers' benches, I have standardized my recommendations that tops be made of beach, birch, or maple. These should be given the acid-proof finish described for laboratory equipment on page 425 of the October, 1917, issue of the INDUSTRIAL-ARTS MAGAZINE.

A number of granolithic and other semistone tops have been tried out but all broke down under the constant hammering attendant on this class of work.—*Ralph G. Waring.*

Glue for Model Airplanes

836. Q.: I would like to know if there is a glue that may be used for gluing the wooden joints of model airplanes which will dry in a few minutes, or seconds rather, while the boy holds the joint in place.—*H. L. H.*

A.: The only suggestion that I can make with the materials and apparatus that I know you will be likely to have, is that you make up a hot hide glue, triple strength, so that it will have such a heavy, viscous body so it will hold as soon as it sets to a jelly. A heavy body casein glue might do the trick, but I am afraid that you are asking too much of your shop conditions.—*Ralph G. Waring.*

Recutting Old Files

843. Q.: Will you please tell me how old files may be recut? —*T. D.*

A.: The files should first be brushed with a wire brush, then soaked in a solution made by dissolving 5 oz. of caustic potash in a gallon of water for a period of about two hours. Then place them in a wire basket in such a way that they do not touch each other, and place them in a stoneware jar in which a solution of 1 part of nitric acid to 8 parts of water, both by volume, has been placed. Remove them from this bath in about one hour and brush them with a hair brush after washing them with water. Then return them to the bath to which half as much sulphuric acid has been added as the original quantity of nitric acid that was used. Let the files remain in this bath for 15 to 20 minutes, then wash them in water, and then in concentrated lime water till all of the acid has been washed off.

This treatment is said to make the files cut like new.

Record Cards

846. Q.: Can you refer me to some articles which show types of record cards to be used in cabinetmaking classes for accounting, the time spent in making the project, the amount of materials used, and the cost?—*R. B. C.*

A.: You can obtain ideas for job and time cards by referring to the following articles printed in past issues of the INDUSTRIAL-ARTS MAGAZINE:

"Shop Record Cards for Daily Check Up in the Woodshop," p. 66, Feb., 1927; "Shop Records for Keeping Account of Materials Used in the Shop," p. 335, Sept., 1927; "Shop Record Forms for Keeping Tab for Work in Household Mechanics Shop," p. 309, Aug., 1925; "Shop Records," p. 115, Mar., 1927; "The Shop Work Receipt," p. 277, July, 1927; "System in the School Pattern Shop," p. 462, Dec., 1924; "Tool Record Sheet," p. 195, May, 1925.

Linseed Oil vs. Water Stain

847. Q.: In the August issue of the INDUSTRIAL-ARTS MAGAZINE, I note in the Question Column that Mr. Ralph G. Waring hesitates to recommend linseed oil on walnut in furniture construction. What are his objections?

I have used linseed oil, white shellac, and varnish, with the necessary filling, sanding, and rubbing with complete satisfaction for four years. In what respect is water staining superior to linseed oil?—*H. T. B.*

A.: In answering questions of this type I am necessarily controlled by the standard results demanded in industry. While an individual can, and ofttimes does, obtain creditable results, yet if such methods were used in the factory no two pieces in the same run of production would look alike. This would not be true of high-grade water stains, since the color values are very uniform, a condition many times shown to be practically impossible with oil as a toning material. Again, if the worker is careless in removing all traces of free oil, and the human factor must be considered, then there is a constant source of trouble in the years to come. Last of all, the piece of oil-treated furniture is seldom, if ever, of the same color two or three years later. This has been the bone of much contention between the retailer and manufacturer when reorders did not match. I have been able to demonstrate that oiling does not pay, since it was directly responsible for darkening the wood.—*Ralph G. Waring.*

Finishing Cherry

848. Q.: We are making a bedroom set, tilt-top table, and several miscellaneous pieces of cherry. The wood is very light in color, almost the color of gum. What stain would you use on this?—*H. T. B.*

A.: The cherry wood should be given a coat of water stain running toward the light orange-brown rather than the light red which is mistakenly considered as cherry. I find a good stain is made by boiling 2 ounces of Bismark brown in a gallon of half-strength vinegar and then shading with a Diamond Black Dye (wood color) until the color is satisfactory. Do not oil this wood, since time will cause the color to become very dark indeed, as I have 25 or 30 years of newel post evidence to bear this out.—*Ralph G. Waring.*

Refinishing Cafeteria Trays

849. Q.: How can I get a suitable finish to apply to sheet-iron restaurant or cafeteria trays that have started to rust. The former finish looks like black enamel. Would it be good practice to take off all the paint?—*G. W.*

A.: In case you have a power spraying outfit, your trays can easily be decorated. It is necessary that the old finish be stripped off in a boiling caustic or commercial cleaner solution, such as 8 ounces of Oakite per gallon of boiling water, using a steel scratch brush or steel wool to hurry the process if necessary. It is very necessary that all traces of the old finish be removed, that all grease be given the same treatment, and that the trays be well rinsed in clean boiling water, followed by drying with heat. The trays should be handled with clean cotton gloves to prevent finger spots which invariably cause rust spots. If the sprayer is available, apply a coat of red-oxide metal primer to be reduced according to the manufacturer's directions, and allowed to dry 24 hours. Follow with two coats of pyroxylin enamel of the desired color, allowing half a day between coats. It will be necessary to spray the back of all trays first, dry, and then spray the faces.

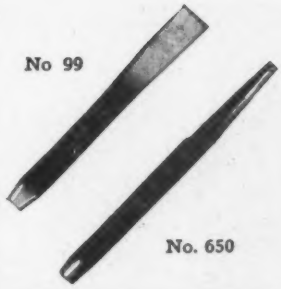
In case the sprayer is not available, clean the trays as outlined above, dry and sand off all rust spots with 4/0 paper. Dust off, and brush on a coat of brushing red-oxide metal primer. This should dry 24 hours in heat if possible. Sand with a split 6/0 garnet paper and recoat if necessary. Apply a coat of quick-drying auto enamel of the desired color, allow two days drying with heat, and if necessary sand with a split 6/0 paper, dust off and recoat. Dry one week before using.—*Ralph G. Waring.*

ANNUAL CHRISTMAS-SEAL SALE IN 1928

The National Tuberculosis Association of New York City has announced the Twenty-first Annual Christmas Seal Sale, to be held December 1 to 25, 1928. The seal for this year shows an old-time galleon with all sails set. The red cross, typical of the association, appears on the main sail.

May this little bearer of Christmas greetings find more and more users so that the worthy objectives of this association be realized.

Instructors in automobile work



Here are tools that stand the "gaff"

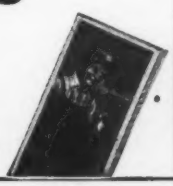
Tools for the automobile shop must be able to stand all kinds of hard work and abuse. Here is a new line of hand tools which has been developed to meet these requirements.

Chisels and punches are made of special electric furnace alloy steel. All tools are properly hardened and tempered.

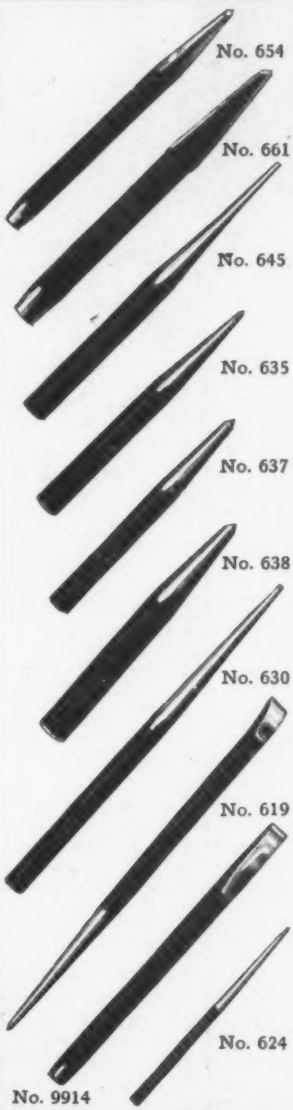
The complete line of Stanley-Atha Tools for the Automotive Mechanic is shown in a special catalog, No. 26. You should know more about these tools. Send for this catalog.

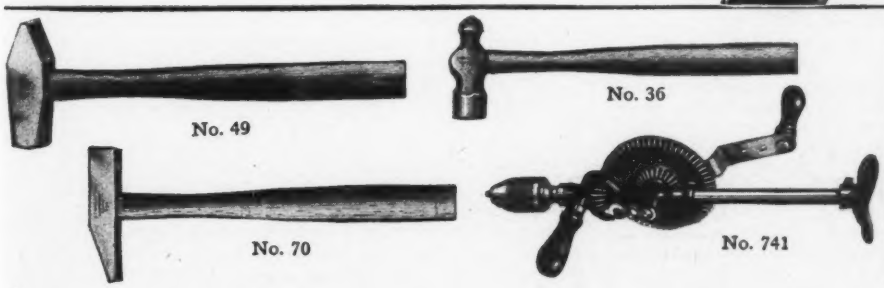
THE STANLEY RULE AND LEVEL PLANT
Educational Department, New Britain, Conn.

STANLEY TOOLS



Stanley-Atha
Catalog No. 26





See the Points?

Can you describe the "Point" of a twist drill?

Do you know what the "Dead Center" is?

Could you explain "Lip Clearance"?

Or "Margin" and "Body Clearance"?

These, and the answers to a dozen other questions, make the Handbook for Drillers the outstanding textbook on twist drills and drilling practice in America. The Handbook is now being used by several hundred vocational schools.

As our contribution to the cause of education in correct machine shop practice, we shall be pleased to forward to you any reasonable quantities of the Handbook for the use of your machine shop classes.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON SAN FRANCISCO
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

AN ACCOUNTING SYSTEM FOR SCHOOL SHOPS

This system and the forms used with it which appeared in an article bearing the same name in the November, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE, was worked out by J. R. Patlow, supervisor of industrial education, and Messrs. Carl Orness and L. H. Alberty, of the Lincoln High School, Lincoln, Nebr.

NEW BOOKS

Plumbing

By Harold E. Babbitt. Cloth, 456 pages, 5⅞ by 9, illustrated. Price, $5. Published by McGraw-Hill Book Company, Inc., New York City.

This book is quite a comprehensive text on the subject of plumbing and contains, besides the practical hints, a great deal of technical matter. It will be found valuable in apprentice and part-time plumbing classes.

The index contains a useful selection of trade terms.

Elementary Craftwork in Metal

By Alfred J. Shirley. Cloth, 120 pages, 5½ by 8¼, illustrated. Price, $2. Published by The Bruce Publishing Company, Milwaukee, Wis.

The author has succeeded in presenting in a thoroughly understandable way how to design, lay out, and finish a number of projects in metal craftwork. These vary from well-designed utilitarian objects to pieces of real beauty. The teacher of metalwork will find here a number of projects from which he can choose at random, or which he can adopt as a full, well-graduated course.

Dictionary of Graphic-Arts Terms

Compiled by Hugo Jahn. Cloth, 12mo. Published by the United Typothetae of America, Chicago, Ill.

The subtitle of this book explains its scope as "a book of technical words and phrases used in the printing and allied industries." It extends to all the graphic arts and to such allied fields as publishing, bookbinding, advertising, electrotyping, engraving, commercial art, etc.

The book is by far the most inclusive work of its kind. While the definitions are accurate, they are frequently informal and descriptive, and gain thereby in informational value. In its own especial field of typography and printing, the work is practically flawless. In some of the related fields, there are minor omissions, based upon the infrequent use of terms in the printshop proper. While the average printer may rarely have use for certain terms, the printer in a newspaper will look for such terms as "tf," "eow," "closing date," "deadhead," etc. The printer who deals with engravers will hear the words, "bite," "cyanide," etc. The printer who buys paper will look for such terms as "bulking book" and for a list of the common paper sizes which are carried in most sections of the country.

The errors are few indeed and perhaps unavoidable in a first edition. When the book is reprinted, "Köenig" will undoubtedly be spelled "König," and "drafting" will precede "drawing" in the alphabetical order. So, too, the present cost of copyrights will be stated as $2, not as 50 cents or $1.

Essentials of Upholstery

By Herbert Bast. Cloth, 175 pages, 5¼ by 7⅛, illustrated. Price, $1.60. Published by The Bruce Publishing Co., Milwaukee, Wis.

This book will be of special interest to the teacher of cabinetmaking who wants to know the best method of upholstering some of the projects made in his classes. The author has divided the subject matter into three parts. In the first are discussed all the essential processes which the upholsterer is called upon to do. In the second part, typical jobs are shown and explained. In the third part the materials which are used by the upholsterer are quite fully discussed.

Each step under processes is very well illustrated so that the beginner can readily follow the author's explanation. The large number of different jobs which are outlined and explained in the second part of the book are invaluable to the teacher who has not had practical upholstering experience. It is a worth-while textbook in the hands of the student and it can be used very well for self-instruction by the man who is confronted with an upholstering job in his home or by the home mechanic who likes to make his own furniture.

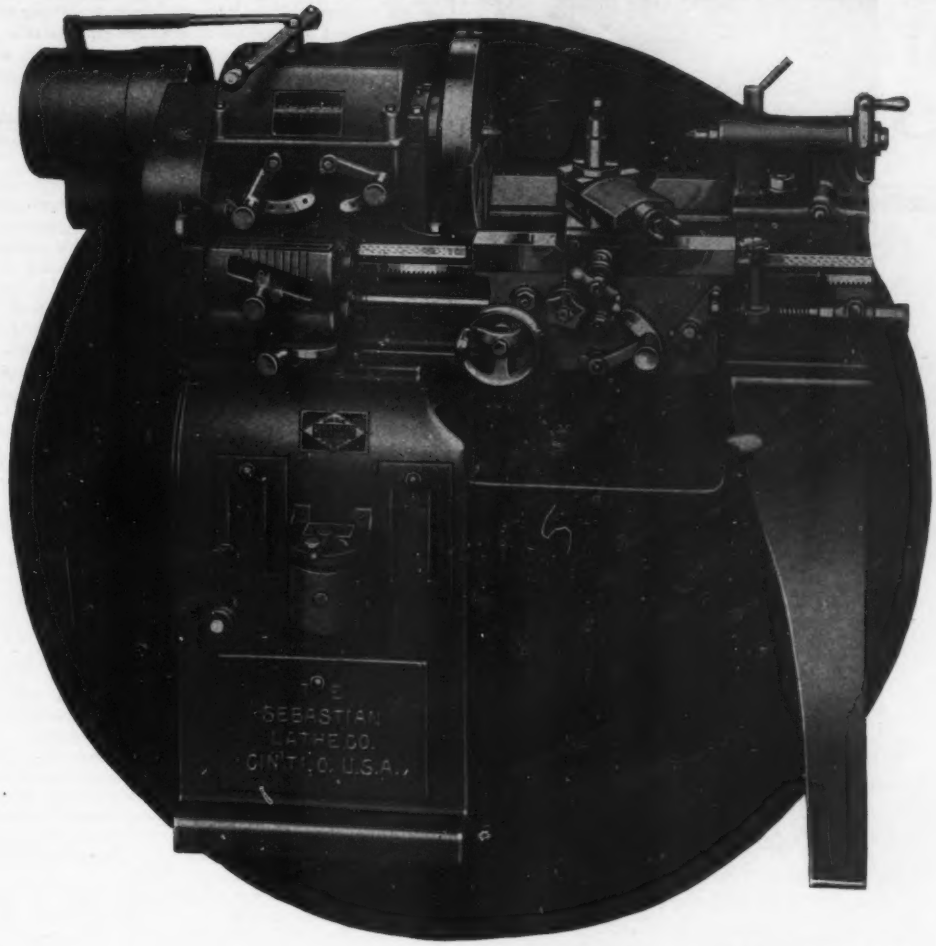
Labor Management

By Gordon S. Watkins. Cloth, 726 pages, 5½ by 8⅛, illustraded. Price, $5. Published by A. W. Shaw Company, Chicago and New York.

This book, which is primarily a college and university text, will be found intensely interesting by all who have anything to do with the management of labor. It contains something about the sociological and psychological factors which enter into the problem, discusses the fundamentals of personnel management, how the labor supply is recruited, and how workers may be selected and placed. It touches upon

(Continued on Page 32a)

IN YOUR NEXT REQUEST FOR BIDS—



Incorporate these Specifications

(....) Lathes Gold Seal or equal—Swing 11", bed length 4', to be 8 speed geared head, full quick change box with no loose gears, to cut threads 3-96, feeds .007 to .156, all steel gears, $1\frac{5}{16}$" hole through spindle, collet capacity $\frac{7}{8}$", bearings of main spindle $2\frac{3}{16}$x$2\frac{3}{4}$ — $1\frac{1}{16}$x$2\frac{1}{4}$", to be taper gibbed throughout, motor drive with motor fitted in leg under headstock with a tool cabinet in the leg below the motor compartment, tumbler yoke for cutting left-hand threads with the depth of the teeth already adjusted on the quadrant for throwing over to a left-hand thread, lathe to be bronze bushed wherever required. Macit tool post screw. Silent chain drive with easy adjustment for stretch in the chain, lathe to be fitted with a safety shearing pin, graduated compound rest and tailstock bases, tailstock center oiler, friction type collars on compound rest and cross feed with these collars graduated, accuracy alignment test .0005, motor and control to be (Specify here type current used and type of control wanted). Each lathe to be furnished with a chip pan, depth thread chasing stop, centers, thread chasing dial, steady rest, and wrenches. The lathes shall all be furnished with all gears guarded by cast iron guards, and the operation of the lathe for stop and start shall be through a friction on the headstock controlled by a lever within easy reach of the operator so that the motor can run constantly when machine is in operation. The apron of the lathe shall have a safety device to prevent both longitudinal feeds being thrown in at the same time.

Add here list of extras wanted such as, Chucks, Taper Attachment, Draw-in Attachment, Collets, Tools, Dogs, etc.

The Sebastian Lathe Co., Cincinnati, Ohio

Room 372—50 Church St., New York City

While left hand holds work, and right hand holds driver steady, you start screw with thumb-turn on blade.

No. 15

No. 10

Pesky little screws are easy with

"YANKEE" No. 15

For with this handy Ratchet Screw-driver you can start wobbly screws quickly by revolving blade with thumb and forefinger.

Thus started you send screw home in a jiffy by Ratchet Movement.

How simple—how useful!

Right and Left Ratchet, and Rigid. Saves time and strength.

Ask your dealer to show you the "Yankee" Ratchet Screw-driver.

No. 15—With "Yankee" thumb-turn on blade. Ratchet shifter moves lengthwise. Six sizes: 2 to 8-inch blades. Price for 4", 80c; 6", 90c.

No. 10—For husky screws. Eight sizes: 2 to 12-inch blades. Price, for 6", $1.05; 8", $1.20.

No. 11—Same as No. 10, except ratchet shifter moves across tool.

Write for FREE "Yankee" Tool Book

Shows how "Yankee" Tools make work easier: Ratchet Bit Braces, Ratchet Breast, Hand, Chain and Bench Drills, Automatic Push Drills, Spiral Screw-drivers, Plain Screw-drivers, Ratchet Tap Wrenches, Vises—removable base. Etc.

"Yankee" on the tool you buy means the utmost in quality, efficiency and durability

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

(Continued from Page 30a)

the newer forms of testing, how to analyze the jobs, explains various wage systems and incentives, and the newer forms of workers' participation in ownership, and also dwells upon methods of taking care of the workers' welfare, company houses, stabilizing employment, and the origin and development of employee representation in government.

A number of organization charts, graphic rating scales, and forms for the personnel department are included in the book.

Algebra for Secondary Schools

By Stephen Emery and Eva Geffs. Cloth, 626 pages, 5⅜ be 7¾, illustrated. Price, $1.85. Published by D. Van Nostrand Co., New York City.

The authors have succeeded in writing a very comprehensive textbook which covers the field of algebra, analytical geometry, trigonometry, and logarithms. The book is quite compact and there are thousands of problems from which the teacher can make his choice. A number of mathematical tables are appended.

Art Metal Work

By Augustus F. Rose. 21 loose sheets, 9 by 12. Published by Metal Crafts Publishing Company, Providence, R. I.

This portfolio contains 19 plates of very nicely designed metal projects for a number of very useful and artistic articles. The teacher who delights in hammered art metal work will welcome these portfolio designs.

PERSONAL NEWS NOTES

Mr. D. M. Schweickhard, state supervisor of industrial education in Minnesota, was a member of the summer-school faculty of the State Teachers' College, St. Cloud, Minn.

Mr. H. J. Smith, of the University of Minnesota, was an instructor in the summer school, which was conducted during the past summer at the Colorado Teachers' College at Greeley. Mr. Smith talked on vocational guidance before the Wisconsin City Superintendents' Conference held on September 27, at Madison, Wis.

Mr. Walter Wolf, formerly foreman of the specialists' training department of the General Electric Company, has been named foreman of the apprentice department and placed in charge of the General Electric Apprentice School at Fort Wayne, Ind. Mr. Wolf succeeds Oscar Weitzman, who has taken over the tool division. Mr. Wolf will continue his duties as director of the specialists' training school along with his new work in the apprentice school.

Mr. J. A. Sandt, head of the department of industrial arts at the Winona, Minn., State Teachers' College, was in attendance at the recent summer session of the University of Minnesota.

Mr. A. V. Larson, of the State Teachers' College at Peru, Nebr., has completed his graduate work leading to the degree of master of arts at the University of Minnesota. The degree will be awarded upon the presentation of the regular thesis.

Mr. Edward Davis, of the State Teachers' College, Hays, Kans., is completing his graduate work at the University of Minnesota.

Mr. Francis Colien, formerly of Oshkosh and Appleton, Wis., has accepted a position at the Milwaukee Vocational School, Milwaukee, Wis. Mr. Colien recently completed a year's study at the University of Minnesota.

Mr. Roy A. Hindermon, formerly of the Riverside High School, Milwaukee, Wis., has accepted a part-time teaching position at the University of Wisconsin. Mr. Hindermon recently received a bachelor of science degree from the University of Minnesota, with a major in industrial education.

Mr. James A. Starkweather, assistant superintendent of schools at Duluth, Minn., and **Miss Elizabeth Fish,** of the Minneapolis Vocational School, were speakers at the meeting of the Minneapolis Vocational Guidance Association, held on October 24. The main topic for discussion at the meeting was "Vocational Guidance in Relation to Nonprofessional Employments."

Major W. H. Henderson has been appointed to the position of commandant at the El Paso High School, El Paso, Tex.

Mr. Percy J. Gardner has resigned as manual-arts instructor at Perry, Mich. Mr. E. W. Doak of Ovid, Mich., has been appointed to succeed Mr. Gardner.

Mr. J. J. Ellis, formerly vice-principal of the Northeast High School at Kansas City, Mo., has been appointed vice-principal of the Lathrop Trade School. Mr. Ellis was at one time head of the industrial-arts department of his high school.

Mr. Louis Schultz, teacher of industrial-arts subjects in the high school at Cape Girardeau, Mo., is gathering material for his thesis for a master's degree at the University of Iowa.

Mr. Lee Rasche has been appointed assistant teacher of industrial-arts subjects in the junior high school at Esther, Mo.

Mr. Martin Roth has been appointed instructor in manual arts in the South Junior High School, Joplin, Mo.

Mr. Paul Hunter has become instructor in manual arts at Clarksville, Miss.

(Continued on Page 35a)

(Continued from Page 32a)

Mr. Walter Robinson is teaching manual arts at Fredericktown, Mo.

Mr. Francis McCabe has been appointed director of the shop and drawing courses in the high school, LaPlata, Mo. He succeeds Virgil Cowles, who has gone to Idaho.

Mr. Otho Barnett has been appointed as instructor in woodworking in the high school, Kirksville, Mo., to succeed W. F. Kolste, who resigned to enter the field of aviation.

Mr. B. G. Shackelford, supervisor of evening schools at St. Louis, Mo., completed a short course in the theory of aeronautics during the past summer. Classes of this character have been introduced in the evening schools, with engineer-pilots as instructors.

Mr. J. A. Hillman has been appointed as assistant superintendent of the David Ranken, Jr., School of Mechanical Trades at St. Louis, Mo. Mr. Hillman succeeds Mr. O. H. Turner, who has become superintendent of the school, succeeding the late Dr. Gustafson.

Mr. W. J. See has been appointed acting director of the vocational high school at St. Louis, Mo. Mr. See was formerly director of the Y.M.C.A. trade school and recently completed a summer course at Washington University.

Mr. P. C. Hale has been appointed director of printing in the Dallas Vocational School at Dallas, Tex.

Mrs. E. L. Smith has been elected instructor in foods at the Dallas Evening School, Dallas, Tex.

Mr. J. T. Reynolds has been appointed instructor in related mathematics at the El Paso Vocational School, El Paso, Tex. Mr. Reynolds succeeds Mr. C. C. Rigney, who goes to Arlington, Tex.

Mr. Clifford E. Troutz, formerly instructor in industrial arts at San Antonio, Tex., has been appointed vice-principal of the Breckenridge High School.

Miss Etna Eason has been appointed as an instructor in a special room at the El Paso Vocational School, El Paso, Tex.

Miss Margaret Murphy has been appointed as director of art in the New York City high schools, to serve until January 31, 1929. Miss Murphy was formerly a teacher of free-hand drawing in the Manual Training High School.

Mr. O. V. Winks has been appointed as vocational instructor at the Lincoln High School, Cambridge City, Ind. Mr. Winks succeeds W. R. Amick.

PUBLICATIONS RECEIVED

Teachers' Salaries in Endowed and State-Supported Colleges and Universities, Especially Colleges of Arts, Literature and Science for the year 1926-27. Prepared by Mr. Trevor Arnett. Paper, 83 pages. Published by the General Education Board, 61 Broadway, New York, N. Y. The pamphlet shows the total and average salaries and the number of teachers receiving these salaries in the several colleges and universities of the country.

Curriculum for Elementary Schools of Minnesota. Paper, 656 pages. Price, $1. Prepared and issued under the direction of the state board of education at St. Paul, Minn. The pamphlet contains a section devoted to a course in industrial arts for boys in the seventh and eighth grades which is intended to be used in all the schools of the state. The booklet, in size and scope, is quite complete and shows clearly the character of the service which the state department is rendering the schools of the state. It outlines not only the objectives, but also the means by which these objectives in industrial arts can be reached.

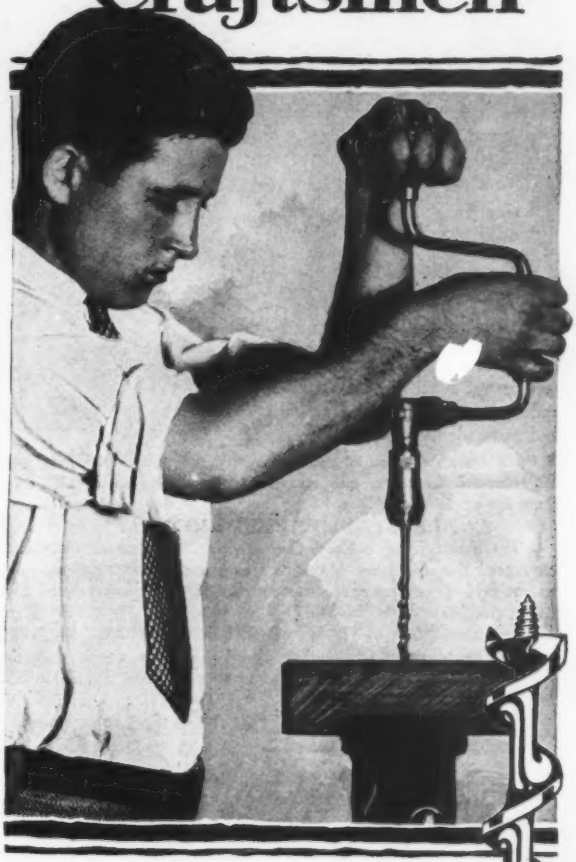
Annual Report of the Board of School Commissioners of Baltimore, Md., for the year ending December 31, 1927. Paper, 135 pages. Prepared and published by the board of education of Baltimore. The booklet contains a section devoted to the work in vocational education, prevocational education, and night-school work as it is carried out in the Baltimore schools. It also discusses the work of the special committee in revising the courses of study for mechanical drawing, sheet-metal work, electricity, woodwork, and machine-shop practice in junior and senior high schools.

Bulletin of the LaCrosse Evening Vocational Schools of LaCrosse, Wis., for the school term beginning with October, 1928. The booklet contains the vocational-school programs for men's and women's classes, for mixed classes, and a variety of shop courses for the high schools.

Pupil Counseling in Grades Seven to Twelve. Prepared by Mr. F. L. Stetson and Mr. C. L. Huffaker. Bulletin No. 6, 1928. Paper, 264 pages. Published by the University of Oregon, Eugene, Oreg. This bulletin has been prepared to explain the nature and purpose of guidance through counseling, to show that it is feasible, and to encourage principals and teachers to study the guidance problem and to accept the responsibility for counseling. The bulletin has been written with special reference to the small schools and contains suggestions on organization and procedure and a bibliography of helpful material. It is expected that the bulletin will be of special help to teachers and principals in the development of counseling in the junior and senior high schools.

(Continued on page 38a)

Better Tools make Better Craftsmen



PRIDE in doing well-finished work does more towards holding the interest of your students than any other factor. Irwin Auger Bits, because of their clean, true cutting ability, help to develop this pride. They help to make your students better craftsmen.

The Irwin Auger Bit with Mainbor Cutting Head has been designed for manual training and industrial arts classroom work. A special set of thirteen Irwin Bits ranging in 16ths of an inch from ¼ inch to 1 inch will help make your job easier.

THE IRWIN AUGER BIT COMPANY
WILMINGTON, OHIO

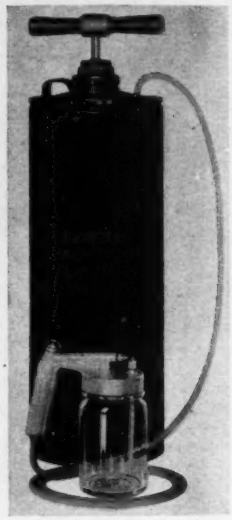
The IRWIN Bit MAINBOR

IRWIN *Auger Bits*

SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW DEVILBISS SPRAY-PAINTING OUTFIT



The increasing demand for a low-priced spray-painting outfit which will produce efficient and satisfactory results has led to the manufacture of the type TZ spray-painting outfit by the DeVilbiss Company of Toledo, Ohio. The new type TZ outfit has been carefully designed and built and sells at the price of $8. It is especially adapted for use in furniture shops, automobile shops, and all places where spray-finishing is done. The outfit successfully handles the modern lacquers, as well as paints, varnishes, enamels, stains, shellacs, and bronzes, and may be used in a variety of ways for decoration, preservation, and renewal of wood surfaces.

The outfit is provided with a hand pump and air reserve which operates easily with one hand. It is under perfect control at all times and is simple and durable in construction and quickly and easily cleaned.

Complete information and prices concerning the DeVilbiss type TZ spray-painting outfit may be obtained by writing to the DeVilbiss Company at Toledo, Ohio.

NEW STANLEY ELECTRIC DRILLS

The Stanley Rule & Level Company of New Britain, Conn., has announced the marketing of six new electric drills to supplement its present line. The new sizes include No. 382 ⅜ in. heavy duty, No. 582 ⅜ in. heavy duty, No. 342 ¼ in. heavy duty, No. 121 ½ in. standard duty, No. 341 ¼ in. standard duty, and No. 781 ⅜ in. standard duty. The addition of these new sizes means that the Stanley electric drills may be obtained in all sizes from ¼ in. standard duty to ⅜ in. standard duty.

The new drills are provided with the same distinctive features which have characterized the former drills. Each has a graceful, compact design, the weight is reduced to a minimum, and all projections which collect dirt and grease are eliminated. The chuck key fits into a convenient holder in the gear housing.

A series of tests have proved that the new Stanley drills have sufficient reserve power and will perform satisfactorily on production work within their capacity.

Complete information and prices of the full line of Stanley products may be obtained on application.

ISSUE BOOKLET OF ADVERTISING TYPE FACES

Under the title of "Modernism in Advertising," Barnhart Brothers & Spindler of Chicago, Ill., have issued a booklet of advertising type faces, including some with a modernistic aspect and also some of the more ordinary type, a few borders of the type and ornamental kind, and some wood tint blocks.

Complete information concerning these type faces may be obtained by writing to Barnhart Brothers & Spindler, at Monroe and Throop Sts., Chicago, Ill.

A BOOKLET OF NORTON PRODUCTS

The Norton Company of Worcester, Mass., has issued a booklet describing and illustrating "The Character and Uses of Norton Products." In its mammoth plant in Worcester, this firm makes such products as grinding wheels, sharpening stones, rubbing sticks and bricks, nonslip flooring materials, refractory materials and grinding and lapping machines. The booklet also tells about the different abrasives and the materials from which they are derived, and the methods of making them into grinding wheels.

Complete information and prices concerning the Norton products may be obtained by writing to the Norton Company at North Bond St., Worcester, Mass.

HOW TO BEGIN THE APPLICATION OF ARC WELDING

The Lincoln Electric Company, Cleveland, Ohio, has recently published a 32-page booklet entitled "How to Begin the Application of Arc Welding in Production Manufacturing." This is a supplement to their textbook, "Arc Welding—The New Age in Iron and Steel."

The booklet treats of the redesigning of existing machinery for purposes of strengthening certain parts. It shows how standard steel shapes lend themselves to this kind of work.

Line drawings and halftones illustrate how the method of arc welding enables the designer to use steel where formerly only cast iron could be used.

The booklet will be furnished free to all present owners of the textbook. Others can obtain copies at a nominal charge. Address communications to The Lincoln Electric Co., P. O. Box 683, Cleveland, Ohio.

ISSUE CIRCULAR OF SAW INFORMATION

Under the title of "Shavings," the Gallmeyer & Livingston Company of Grand Rapids, Mich., issue a monthly four-page circular describing and illustrating their band saws, swing saws, universal saw benches, and other woodworking machinery. The firm carries a complete line of universal saws and jointers, saw benches, plain saws, hand jointers, spindle shapers, hollow chisel mortisers, boring machines, portable band saws, motor-driven swing saws, and lathes.

This company is always ready to furnish technical information about any of their products to teachers and supervisors who contemplate new installations or additions to already existing woodworking power equipment.

ISSUE PORTFOLIO OF ENVELOPE SAMPLES

The Western States Envelope Company of Milwaukee, Wis., has issued a handy wall pocket containing a portfolio of envelope samples of various kinds and qualities, including window envelopes, special trade-mark flap, and look-in and cut-out window types. The samples are compactly inclosed in the pocket, which has a flap at the top for hanging in a convenient place.

Complete information concerning these envelopes may be obtained by writing to the Western States Envelope Company at South Water St., Milwaukee, Wis.

This company also has issued a poster containing the new postal rulings for business reply envelopes and cards, bulk mailings of the third class, reduced air-mail rates, private mailing cards, and other third-class rates. This information will be of considerable help to school authorities and others who handle large amounts of correspondence or direct-by-mail advertising.

STARRETT PRODUCTS WILL BE EXHIBITED AT PHILADELPHIA

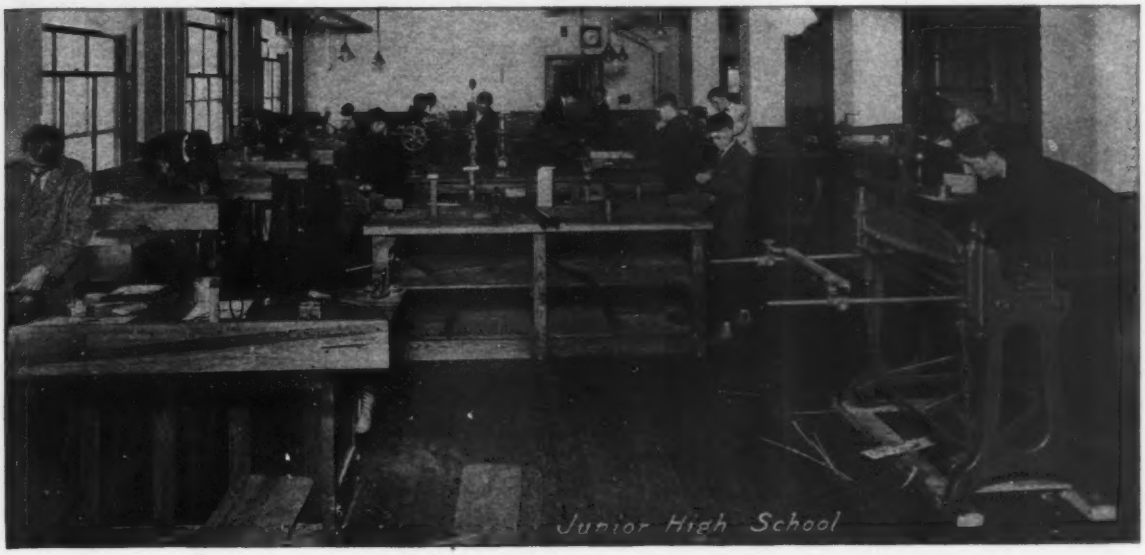
The L. S. Starrett Company of Athol, Mass., manufacturers of fine mechanical tools and equipment, have announced that they will have an exhibit of their products at the coming meeting of the American Vocational Association, to be held December 13-15, at Philadelphia, Pa. The Starrett products will be displayed in Booth No. 19 in the Benjamin Franklin Hotel, where the representatives of the firm will be glad to welcome all shop instructors and school officials.

NEW YORK OFFICE OF PEASE COMPANY MOVED

The New York sales office and display room of the C. F. Pease Company, formerly located in the Grand Central Terminal, has been moved to new quarters on the seventh floor of the Ashforth Building, at 12 East 44th Street, New York City.

In its new location, the firm has increased floor space, with improved facilities for stock and display of its complete line of blueprinting supplies and drafting-room furniture. The firm has ma-

(Continued on page 38a)



Worcester High School, Worcester, Mass.

A typical PEXTO fully equipped SHEET METAL SHOP

Over five hundred vocational schools in America have found that better progress and a higher standard of efficiency in sheet metal working practice are maintained by a full equipment of Pexto machines. There are ***five reasons*** for this:

Number 1

Pexto has been the industry's leader for over 100 years.

Number 2

Pexto is the universal favorite with practical sheet metal artisans the world over.

Number 3

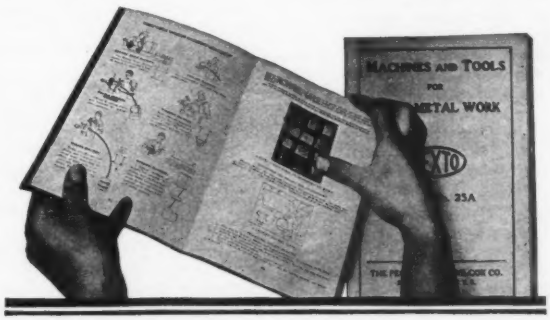
Lowest initial cost consistent with a high-grade product—with a record minimum cost for upkeep.

Number 4

Ease of performance, durable construction, impressive finish.

Number 5

Every Pexto Tool and Machine is fully warranted in workmanship and materials.



Write for guide 25A—"Equipping for and Teaching Sheet Metal Working." Specify from this guide which is free to supervisors and instructors.

The Peck, Stow & Wilcox Company
Southington, Conn., U.S.A.

PEXTO

SHELDON DRAWING TABLES
STAND THE GAFF!

Sheldon Drawing Tables are made to stand the hardest service for a lifetime. One and three-eighths-inch rails and stiles are used throughout and all joints are mortised and tenoned, glued under heavy pressure, and cross-tie-bolted as shown. There are ten types of Sheldon Drawing Tables. Send for our literature.

E. H. SHELDON & COMPANY, MUSKEGON, MICHIGAN
Vocational Furniture

(Continued from page 36a)

terially increased its sales personnel, making it possible to more efficiently serve the entire eastern coast trade in its demands for blue-printing machinery, blue-print paper, and drafting-room furniture.

PUBLICATIONS RECEIVED

(Continued from page 35a)

A Course of Study in Safety Education for the Elementary and Junior-High-School Grades of Massachusetts. Prepared by a committee, of which Florence A. Somers was chairman. Bulletin No. 4, 1928, of the State Education Department of Massachusetts. The course of study is a revision of a former bulletin issued in 1924 and represents the efforts of the committee to bring the subject matter up to date and to make it of even greater importance as a part of the school curriculum. The illustrative units in the course have been developed by teachers and pupils and much of the material has been tested through classroom use.

Plans for Administration of the Smith-Hughes Act in Connecticut. Vocational Bulletin No. 1, 1927-28. Issued by the state education department at Hartford, Conn. The bulletin shows the extent and character of the Smith-Hughes work carried on in the state of Connecticut and the state appropriations for vocational education, also the number and amount of trades taught in the state-aided schools.

The Use of Research in Standardization and Simplification. Paper, 20 pages. Published by the policyholders' service bureau of the Metropolitan Life Insurance Company at 1 Madison Ave., New York City. The brochure contains data on research in industry gathered during a survey of New England industry. It offers a brief history of the accomplishments of 28 New England companies through this method.

History of Vocational Education in Canada. Paper, 20 pages. Published by the Technical Education Branch of the Department of Labor at Ottawa, Canada. The booklet contains a history of the development of vocational education in Canada and a description of the work of the Royal Commission on industrial training and technical education.

Educational Opportunities of Greater Boston for the School Year 1928-29. Paper, 146 pages. Price, 50 cents. Published by the Prospect Union Educational Exchange, 760 Massachusetts Ave., Cambridge, Mass. The pamphlet lists 2,500 courses in 375 different subjects offered by 156 schools of Greater Boston. The courses are particularly suited for workingmen and women of the metropolitan area and most of them can be taken after working hours. The courses cover not only business subjects, but cultural subjects as well and are intended to offer a wealth of opportunity for self-improvement at a very low tuition cost.

The Training and Experience of 480 Industrial-Arts Teachers. By Fred Strickler. Paper, 115 pages. Price, $1. Published by Teachers College, Columbia University, New York. The study was undertaken with the cooperation of the industrial-arts teachers, supervisors in public schools, and college teachers, and the topics in the subject-matter analysis are taken from readings, lectures in college courses, conference, and personal experience. The booklet discusses the topical analysis of subject matter, the training of industrial-arts teachers, the experience of these teachers, and the relation of the study to teacher training.

The Vocational Messenger, September-October, 1928. Paper, 29 pages. Edited and published in the Albany Boys' Vocational School, Albany, N. Y. A booklet of news and information concerning the work of the boys' vocational school.

Educational News, September-October, 1928. Paper, 24 pages. Published by the state education department at Charleston, W. Va. Contains news and information about the schools of West Virginia.

New Postal Rulings. Prepared and published by the Western States Envelope Co., Milwaukee, Wis. Contains important information relating to postal rates on business reply envelopes and cards, bulk mailings of the third class, air-mail rates, private-card rates, and other third-class rates. The information should prove helpful to publishers and printers and to direct-mail advertisers and others who must mail large quantities of material of this character.

Samples of Dependable Envelopes. Issued by the Western States Envelope Co., Milwaukee, Wis. Contains a large collection of envelopes of different kinds manufactured by the firm.

Mechanical Drawing in Accredited High Schools of Texas. Prepared by Mr. N. S. Hunsdon. Bulletin 235, 1928, issued by the Texas State Education Department at Austin, Tex. The bulletin is intended to serve as a tentative standard in the teaching of the subject in the high schools of Texas. The course has been planned to offer unit courses of eighteen weeks each, including general mechanical drawing, machine drawing, and architectural drawing. The booklet offers a list of the minimum equipment and lists of books on mechanical and architectural drawing.

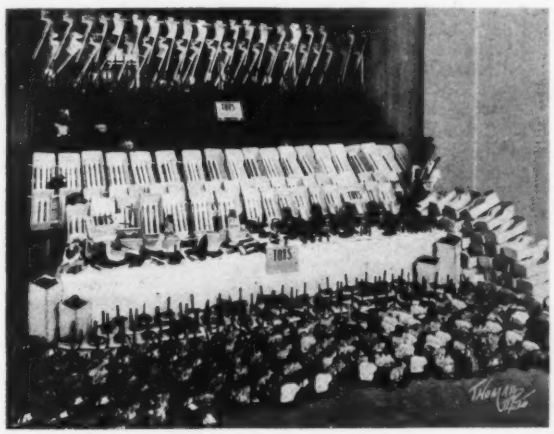
(Continued on page 41a)

(Continued from page 38a)

Philadelphia Building Congress Promoting Year-Round Construction. The Philadelphia Building Congress of Philadelphia, Pa., has issued a 4-page circular describing and illustrating the promotion of building construction in winter as well as in summer. The organization maintains a committee on year-round construction which is regularly promoting the work and has been successful in keeping a large number of craftsmen and laborers at work. The illustrations show the amount and variety of winter construction work which has been carried out under the slogan, "Make Every Month Count."

MANUAL-ARTS STUDENTS OF HUNTINGTON, W. VA., CONSTRUCT TOYS

The manual-arts department at Huntington, W. Va., recently completed a collection of over one thousand toys. The toys consisted of a varied collection for boys and girls, including doll cradles, carts, boats, cannons, straddle horses, miniature animals, ring toss, toy furniture, and similar projects.



The toys were constructed of short lengths of lumber, provided by the local lumber and supply club and were donated to the Salvation Army, the children's hospital, and the Union Mission for distribution among poor children.

The entire work of constructing and finishing the toys was done by the boys of the manual-arts department, under the direction of Mr. H. A. Lightner, supervisor of the department.

NEWS AND NOTES

Employed Children of New York Must Attend Continuation School. The court of appeals of New York has rendered an opinion in which it holds the continuation-school law of the state constitutional. In upholding the constitutionality of the law, the court discussed the problem in an interesting way. The decision reads in part, as follows:

"There is a reason for the distinction. That children, at work all day, should also be compelled to study at nights is an evil in itself. Probably, under present conditions, it is an evil that may not be wholly corrected. So far as possible it should be minimized. Day-school attendance should be encouraged. Many employers may co-operate in carrying out the policy of the department. Others might not. They might insist that their employees attend night school to avoid the interruption, thus making such attendance in effect compulsory.

"Once we had a law requiring children working in the daytime to attend evening school. The experiment was abandoned. It was found that their health was injured out of all proportion to the value of the education they received. The requirements as to girls also involved moral hazard. That should not be done indirectly which was found unwise when done directly. In truth, the evening schools are intended primarily for those who have reached maturity. An even four hours a week in a continuation school is not a mere waste of time. They do not confine themselves to vocational training. Optional courses may be taken leading to general education. For these reasons we think the distinction made by the legislature between day and night schools is justified.

"All minors in districts where continuation schools are in existence, are treated alike. The law is one affecting education solely; it is not discriminatory. It separates those who have completed a four-year secondary course from those who have not. It seeks to induce all to do so. If they will not or can not, it makes their right to work subject to the necessity of acquiring some further daytime instruction. The legislature might forbid all minors under 18 to engage in regular work

(Continued on page 42a)

Drawing Tables

—for Any School
—for Any Size Class
—for Any Number of Students

For 8 Students
No. 205

Provides individual accommodations for 8 students. Four compartments open to the front and four to the rear, holding drawing boards, and other equipment. This desk takes care of the greatest possible number of students in the same room.

For 6 Students
No. 220

One of our best sellers—very roomy and comfortable, with an adjustable top. Very popular for high schools—6 compartments for 6 students—each containing drawing board, T square, triangles, paper, and instruments.

For 4 Students
No. 240

A good type of Drawing Table for Universities. Provides accommodations for four students, each with individual drawing board compartment and individual drawer for instruments, both locked with same padlock.

The old order is passing—modern schools are becoming equipped with attractive and highly efficient Kewaunee Drawing Tables.

The Kewaunee line comprises Tables designed for two to eight students—all designed for the greatest compactness, comfort, and convenience. They are firmly constructed to insure rigidity for long service under rough student usage. Finished in Light Golden Oak—the standard Kewaunee finish—or we match any special finish desired.

We are manufacturers of a very complete line of Art and Mechanical Drawing Tables. Write for our complete Book of Illustrations.

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL Industrial Arts & Vocational Education Edition

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

Adrian Factory
C. G. CAMPBELL,
Pres. & Gen. Mgr.

Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges

ADRIAN, MICH.

You Can Make This Bridge Lamp In Your Classes

This bridge lamp is not as hard to make as it looks. Everything is furnished, so all that is necessary is to follow the directions which are included. Those who have made this bridge lamp project tell us of the enjoyment they had in making it and how really good-looking the lamp was when made.

Seventh and eighth-grade pupils made many of these lamps last year. A few were made by sixth-grade pupils, and the balance were purchased for students in high schools and junior high schools.

Everything is furnished. Substantial base and frame support, two-way adjustable bridge lamp fixture, electric cord and plug, plenty of weaving materials in any color combination desired, glue sizing, and directions. Only the best materials are furnished. Guaranteed materials made for a lifetime of wear. The lamp stands 60 inches high. The shade has a diameter of 14 inches. Shipping weight 16 pounds.

Price $4.55.

With colored Art-Fibre any color harmony desired can be obtained, as there are fourteen colors from which you may select.

Two-color combinations, that is, using one color for the regular weaving and another color for whaling, braiding or trimming, produce some pleasing and colorful effects.

The colors in which Art-Fibre is made, and from which you may choose any combination desired, are Old Rose, Soft Blue, Blue, Emerald Green, Soft Green, Orange, Lemon Yellow, Lavender, Taupe, Black, Red, Brown, Walnut Brown, and White.

There are more than a hundred practical furniture projects, ranging from simple refreshment trays to complete suites of living-room furniture, that can be made in your school classes without any special equipment. Our "Book of Designs and Materials" illustrates, describes, and prices 136 different projects. A copy of this will be sent free on request.

Order this attractive Bridge Lamp No. 260 and prove the merits of Art-Fibre Furniture Weaving. Use the coupon.

Grand Rapids Fibre Cord Co.,
609 Myrtle Street N. W., Grand Rapids, Mich.

Please ship to me Bridge Lamp No. 260 @ $4.55. I want.....color for weaving and..... color for trimming.

Name.....

Address.....

.....

Teacher at.....

(Continued from page 41a)

during the hours of the school day. It might require them to spend those hours in study. It may do less." (People vs. Braunstein, 162 N.E. 89, decided May 29, 1928.)

Aviation Club at Shorewood. An aviation club has been organized in the high school at Shorewood, Wis., for the purpose of studying the theory and mechanics of flight. The club has thirty members and an equipment valued at $13,000, which was donated to the school by the navy department.

Hold Fifth National Soap-Sculpture Contest. The fifth national soap-sculpture contest for the Proctor and Gamble prizes will be held during 1929, the contest closing on May 1. The competition for the best work in sculpture offers $1,675 in prizes and is open to amateurs and professionals.

The amateur section includes two groups for students—senior and junior. In the senior group, for those over 15 and under 21 years of age, the first prize is $100, the second prize $75, the third prize, $50, the fourth prize $30, and ten honorable mentions of $10 each. In the junior group, for those under 15 years of age, the first prize is $25, the second prize $20, the third prize $15, the fourth prize $10, and ten honorable mentions of $5 each.

In the section for advanced amateurs, the first prize is $150, the second prize $75, the third prize $50, and five honorable mentions of $15 each.

In the professional class, the first prize is $300, the second prize is $200, and the third prize is $100. A special prize of $250 is offered in the professional group for straight carving.

An exhibition of the prize-winning and other accepted sculptures will be open to the public during the month of June, 1929, in New York.

Civil Service Examination for Tabulating-Machine Operator. The U. S. Civil Service Commission has announced an open competitive examination for a senior tabulating-machine operator, to be held on November 27. The examination is to fill vacancies in the war department, Washington, D. C., and in positions requiring similar qualifications, and offers a salary of $1,620 per year.

Full information may be obtained from the U. S. Civil Service Commission, Washington, D. C., or from the secretary of the Civil Service Board of Examiners at any post office or customhouse.

Civil Service Examination for Artist. The U. S. Civil Service Commission of Washington, D. C., has announced an open competitive examination for the position of botanical artist on December 5. The examination is to fill vacancies in the bureau of plant industry, in the department of agriculture, for duty in Washington, or in the field. The position carries salaries ranging from $3,200 to $3,700.

Complete information concerning the examination may be obtained by writing to the U. S. Civil Service Commission at Washington, or the secretary of the Civil Service Board of Examiners at any post office or customhouse in any city.

Advertise Evening Courses at the Oklahoma City Night School. The Oklahoma City Night School at Oklahoma City, Okla., in a special four-page circular, advertises the benefits of the evening courses offered in the school, including such phases as commerce, homemaking, academic, and trades and industries. A fee of $3 is charged for a semester of twelve weeks.

Organize Hobby Club at Valley City, North Dakota. A hobby club has been organized at the junior high school, Valley City, N. Dak., with an enrollment of over 50 per cent of the boys of the school. The club was formed last year under the direction of Mr. G. F. Billey, supervisor of industrial work in the Valley City schools.

A Parent's Bookshelf. The Child Study Association of America, with offices at 54 West 74th St., New York City, has issued a new book list containing suggestions for parent's first bookshelf. The list contains 25 titles with author, publisher, and price, and will be found helpful to anyone who is doing serious reading along the lines of child training. The bookshelf has been prepared by leaders in child training and the special committee of the Child Study Association and sells at the price of 5 cents.

Ceramic Arts in Detroit High School. A knowledge of ceramic art in its relation to historic periods, as well as from a technical standpoint, is the aim of the pottery course offered in the Eastern High School at Detroit, Mich. The school has a collection of pottery of different countries and the students make frequent visits to the Art Institute to study historic examples. Visits to a commercial pottery are made by advanced students to observe modern methods.

Opposes Federal Aid to Vocational Schools. The adoption of a policy of equal subsidy for vocational and agricultural education in the various states as a permanent policy has been personally opposed by Dr. C. R. Mann, director of the American Council on Education, as being dangerous and contrary to the public interests, at a hearing on a bill introduced by Mr. Menges of York, Pa.

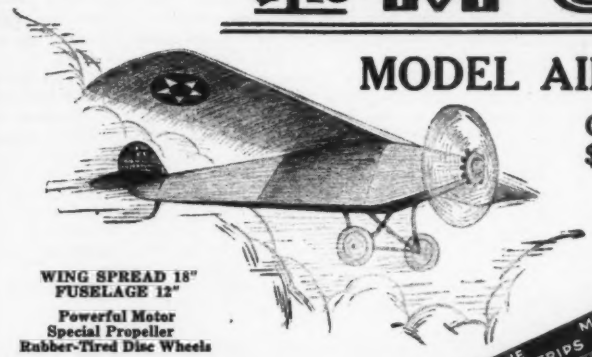
The Menges bill would provide for the development of vocational education by the appropriation of $500,000 for the fiscal year ending June 30, 1929, and for each year thereafter, for eleven years, a sum exceeding $500,000, the sum appropriated for each preceding year,

(Continued on page 44a)

The MOCAR

MODEL AIRPLANES THAT FLY!

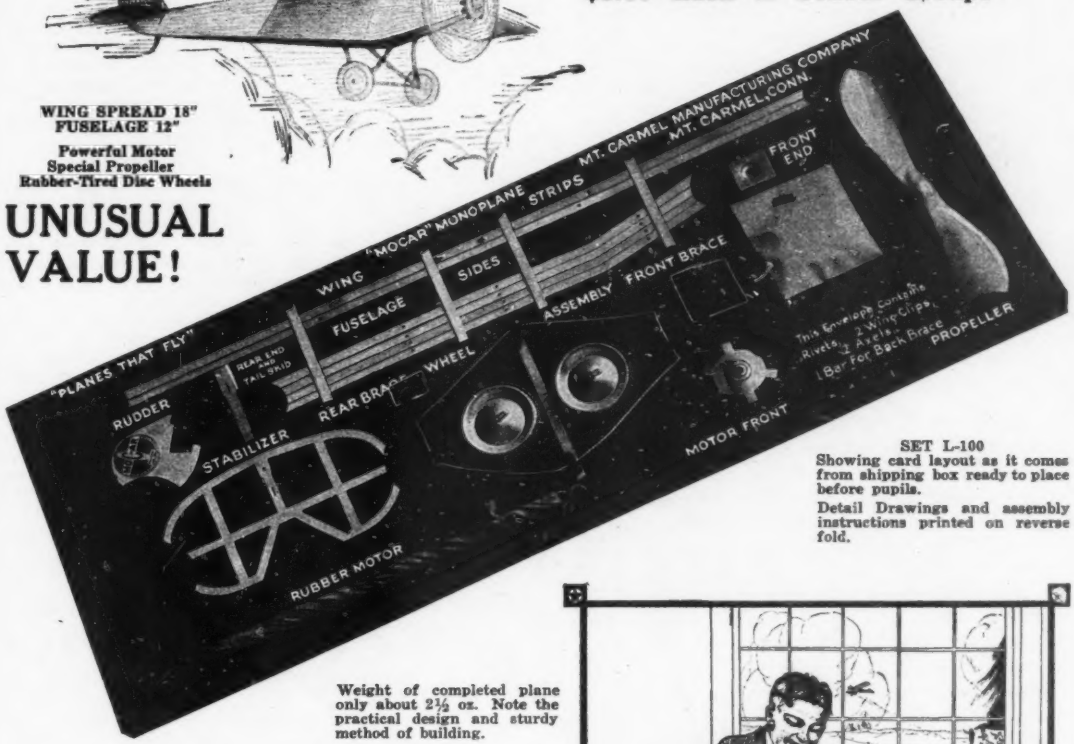
Construction Set No. L100 Only
$1.00 Each to School Groups



WING SPREAD 18"
FUSELAGE 12"

Powerful Motor
Special Propeller
Rubber-Tired Disc Wheels

UNUSUAL VALUE!



SET L-100
Showing card layout as it comes from shipping box ready to place before pupils.
Detail Drawings and assembly instructions printed on reverse fold.

Weight of completed plane only about 2½ oz. Note the practical design and sturdy method of building.

AIRPLANE INSTRUCTION THROUGH CONSTRUCTION

"MOCAR" airplanes are especially made for manual instruction and school assembly work. For both city and rural schools, these planes fill the immediate demand for airplane building material for manual training.

All parts are made of aluminum and finished ready for assembly. No special tools or benches are needed, as only pliers are used for assembly. The work is easy and can be performed on ordinary school desks or in work shop. Simple instructions furnished. Complete in every detail.

When completed, this plane will actually fly, taking off from the ground. It is strong—and will stand considerable abuse. Replacement parts are furnished at small cost.

Set No. L-100 illustrated ready for immediate delivery.

This is a practical, simply designed, real model plane that fills the urgent need for instructive airplane construction material *at a moderate cost.* Complete with rivets, bolts, wheels, wing and fuselage covering material, etc., ready for pupils to start work immediately.

This is an ideal model airplane that offers instruction in both airplane manufacture, and in flying. It is well to remember that all *real* airplanes are first tested by making *models.*

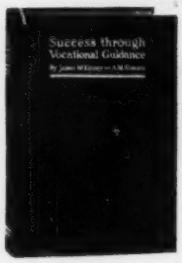
Write immediately for full information to cover your requirements. Send $1.25 for sample postpaid, or $1.10 each for six, or your purchase order. Orders filled strictly in rotation.

THE MOUNT CARMEL MFG. COMPANY

DEPT. H, MOUNT CARMEL, CONNECTICUT

Designed and Made by School Men for School Use

"SUCCESS through Vocational Guidance"



This splendid text is now enjoying more popularity than ever before. There is a constantly increasing demand for it from teachers in vocational, trade, industrial, and high schools, because the authors go directly to the heart of this important subject. James McKinney and A. M. Simons know the subject thoroughly, and, furthermore, have the gift of imparting their knowledge in a clear and interesting manner. All of the principal occupations are analyzed — engineering, teaching, commerce, banking, transportation, manufacturing, law, etc. The educational requirements, special training, experience, rate of advancement, salaries, and opportunities are discussed in a masterful style. It will pay you to make a thorough inspection of this book. Good-looking, durable green cloth binding; titles in gold; 270 pages; indexed for instant reference. Price $2.00.

Other Popular Textbooks

Architectural Design & Lettering—Ritow-Brown	$2.00
Armature Winding—Moreton	2.00
Blueprint Reading—Fairfield-Kenison-Waite	2.00
Foundry Work—Gray	2.00
Interior Electric Wiring—Nelson	2.50
Machine Drawing—Griffin-Adams	2.00
Machine Shop Work—Turner-Perrigo-Fairfield	2.50
Plumbing—Gray-Ball	1.50
Practical Mathematics—Hobbs-Waite	1.50
Radio Practice—Haan-Tate-Hayward	1.50
61 Electrical Lesson Pamphlets (each)	.25
56 Automotive Lesson Pamphlets (each)	.25
10 Mechanical Drawing Lesson Pamphlets (each)	.20

On Approval

To prove the utility of our publications, we will send any of these texts for thirty (30) days ON APPROVAL examination without obligation to you. Just fill in the coupon and those that you select will be promptly sent forward with the understanding that if you retain any you will be given the benefit of the usual educational discount. Those not kept may be returned for credit.

AMERICAN TECHNICAL SOCIETY

Drexel Ave. and 58th Street, Chicago Dept. H. S. 6

— — — — (Tear off here and mail to us) — — — —

AMERICAN TECHNICAL SOCIETY
Drexel Ave. and 58th Street, Chicago, Dept. H.S. 6

Please send the following books for thirty (30) days ON APPROVAL examination. I will either return them within that time or else remit, less your educational discount. Also send folder describing your complete line.

.....

.....

Name.....

Address .....

Official Position.....

School .....

(Continued from page 42a)

and for each year thereafter, a permanent appropriation for each year of $6,000,000.

Under the provisions of the bill, one half of such sums will be allotted to the states in the proportion that their farm population bears to the total farm population, exclusive of the territories and insular possessions, according to the census last preceding the end of the fiscal year in which any such allotment is to be made.

Mr. Mann said he was not opposed to industrial education and that he thought it was of great value, but he thought the proposed appropriations would extend the work much further than ever before. He favored the states conducting their own vocational training, the Federal aid to be withdrawn gradually.

Mr. Mann advocated a two-year program in place of a ten-year program, because under the former, the responsibility for continuing the work would be forced upon the states. He urged that a survey of the American school system and of the work accomplished through Federal aid can be made through the Bureau of Education, and that an appropriation of $100,000 be made for the purpose. Mr. Mann expressed the fear that the separation of vocational, agricultural, and higher education is leading to the establishment of an educated aristocracy.

Report of Wisconsin Advisory Committee on Manual Arts. The Wisconsin advisory committee on manual arts recently presented its report to the state superintendent of public instruction. The committee was composed of teachers, superintendents, and presidents of various schools, who were appointed with the purpose of clarifying certain problems connected with the work in manual arts in the Badger state.

The committee members were of the opinion that some real problems had presented themselves and were in need of solution. One of the principal ones had to do with the findings regarding the objectives of manual arts in the public schools, especially the junior and senior high schools.

It was decided to appoint a subcommittee to work upon, develop, and report at a subsequent meeting, facts regarding certain phases of the various problems presented. Eleven candidates were nominated, who were then voted upon, and the six receiving the highest number of votes were declared elected to the committee. Those elected were Mr. C. A. Bowman, Stout Institute; Mr. J. F. Friese, University of Wisconsin; Mr. T. A. Hippaka, Madison; Mr. E. S. Lamoreaux, Janesville; Mr. B. M. Meyer, Chippewa Falls; Mr. E. Thrall, Beloit. The chairman of the meeting, Mr. H. W. Schmidt, of Madison, was appointed ex officio chairman of the subcommittee.

In discussing the work of the committee, it was decided that the major problem to be developed is that of objectives. It was left to the subcommittee to plan the division of the work and the development of the subject.

It was decided to hold a meeting of the advisory committee not less than once a year.

Action was taken to increase the size of the advisory committee, with the appointment to the committee of Mr. Robert Williams of Spring Green, Mr. O. J. Guerin of Mellen, and Mr. Harvey Waffle of Kilbourn.

Bricklaying Classes of Wiggins Trade School Erect Small Buildings. Students of the bricklaying classes of the Wiggins Trade School, Los Angeles, Calif., have erected a number of small buildings. Following a short period of intensive training in the school, the students, without previous knowledge of the trade, compete with journeyman bricklayers and their services are in great demand.

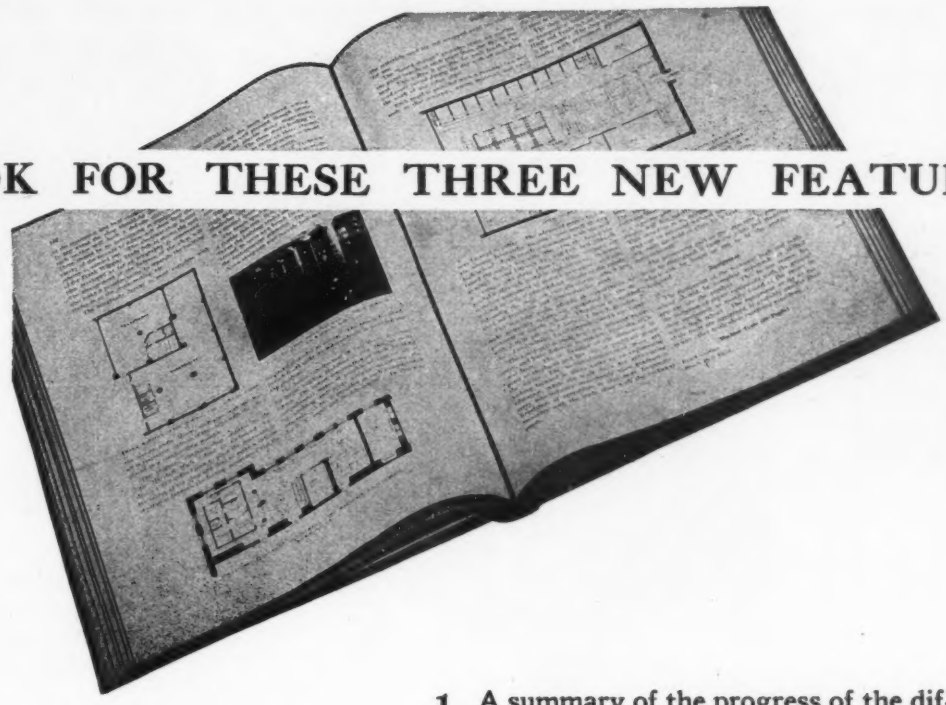
Junior Vocational School in Grand Rapids, Mich. A junior vocational school is maintained in Grand Rapids, Mich., for retarded children 14 years of age, who are not eligible to the regular city vocational schools because of not having completed the 8th grade. In this school, one half of the school day is given to training in the shop or workroom. The plan has proved remarkably successful with children who have become restless and discontented in the regular grades.

Class in Oxy-Acetylene Welding for Apprentices at St. Louis. The steamfitters' union of St. Louis, Mo., in cooperation with the board of education, has established a training class for apprentices in oxy-acetylene welding. A new process in connecting pipes in the steamfitters' trade had been adopted, but it was found that only a few men in the trade were capable of installing the equipment in the new way. The class was established by the union as a means of meeting the situation in the trade.

Vocational Guidance in Czechoslovakia. Czechoslovakia plans to establish some 400 vocational-guidance offices during the next 20 years. It is proposed that the cost of establishment and maintenance be shared, one third by the employers, one third by the workers, one third by the state, the provinces, and the municipalities. The payments of the employers and the workers will take the form of supplementary contributions to social insurance.

Mechanics Institute Seeks Endowment Fund. A campaign has been started to raise $3,000,000 for the Mechanics Institute at Rochester, N. Y. The campaign for funds has been started as a result of a survey of the institution and its work by a special com-

(Continued on page 46a)



LOOK FOR THESE THREE NEW FEATURES

SEE OUR DATA IN
BRUCE'S SPECIFICATION ANNUAL
1929 EDITION

This New Mark will identify progressive manufacturers.

1. A summary of the progress of the different shop subjects in the various states as contributed by the State Directors of Vocational Education, with an introduction by J. C. Wright, Director, Federal Board of Vocational Education.

2. An authentic directory covering the Federal and State Departments of Vocational Education, Teacher Training Schools, etc.

3. A bibliography covering sources of school shop information and projects.

1929 EDITION BRUCE'S SPECIFICATION ANNUAL

READY JANUARY 1929

These pieces can easily be constructed by anyone of average mechanical ability. We furnish frame completely set up, all covering cut and sewed, spring reversible cushion completely made, all springs, webbing, filling, etc., necessary to make the chair. You get all material required. For complete information see our new catalog.

You Can Easily Make This Attractive Coxwell Chair and Ottoman

These Pieces Are Large and Exceedingly Comfortable

Catalog mailed gratis

THURSTON MANUAL TRAINING SUPPLY CO.

ANOKA, :: :: :: :: MINN.

(Continued from page 44a)

mission. The commission reported that the institution is doing a necessary educational work, giving training to thousands of young men and women whom neither the University, nor the public schools can serve. Its recommendation was that the Institute continue its splendid work as an independent, flexible agency, in order to meet the growing demands for training that will prepare students for industry and the home.

Prohibit Explosives in School Shops of Los Angeles. The attention of the Los Angeles board of education was recently called by the fire underwriters to the fact that some schools have purchased through school funds and have used nitrocellulose or pyroxylin for lacquer work in the school shops.

Upon receipt of the notice, the superintendent of schools immediately issued an order prohibiting the use of this highly explosive material in school shops. Principals were warned that it is a misdemeanor to purchase a dangerous product not permitted on the standard list. Schools having any of this material in use or in stock, were ordered to remove it from the buildings immediately.

Would Improve Technical Course Through Cooperation of High Schools and Colleges. The formation of a joint committee on curricula matters composed of representatives from the high schools and the engineering colleges, with a view of bringing the curricula of the schools and colleges into closer working relationship has been advocated by Mr. T. A. Distler, director of student welfare at New York University. Mr. Distler points out that many of the engineering colleges are teaching courses and covering material which might better be taught in the technical high schools. On the other hand, the technical high schools are attempting to teach subjects which should be taught in the engineering colleges. He shows that there is a tendency in the technical high schools to overemphasize the vocational side, which tends to make the students expert technicians but very poor theorists. Mechanical ability, Mr. Distler points out, is not as necessary to the high-school boy as is sound basic training in mathematics and the fundamental sciences.

High-School Credits in Industrial Arts. The state education department of Texas has evolved a new plan of high-school accrediting for the industrial arts, in which each branch of the industrial arts is assigned credit of from one to two units, according to the time available and the worth of the work. Teachers of the state have generally approved the plan, but some details are at present lacking to make the plan entirely adaptable to the industrial arts.

Texas Enlarges Vocational Program. The vocational activities of the state of Texas have been enlarged and stimulated through the legislative matching of the Federal funds, according to Mr. N. S. Hunsdon, state director of vocational education. Through more vital contacts with employed persons in the industry, the work in the evening and part-time schools is being emphasized, with some day trade classes conducted in the large cities. The foremanship courses have proved quite popular in the oil communities.

Progress of Vocational Work in Missouri. Mr. G. H. Reavis, state supervisor of vocational work in Missouri, has issued a brief statement showing the remarkable progress made in vocational work during the last ten years. He shows that vocational home-economics work is taught in 69 day schools, which prepare girls for the art of homemaking. Evening and part-time schools have also become numerous and several thousand persons receive training in homemaking. More than $35,000 in special aid is distributed to school boards where home economics is taught, and $212,000 is distributed annually to schools teaching vocational agriculture.

There are fifteen centers in the state where industrial training is carried on. Vocational training through part-time and evening schools encourages the workers to advance to better positions. Over $160,000 annually is distributed to the schools as reimbursement for trade training.

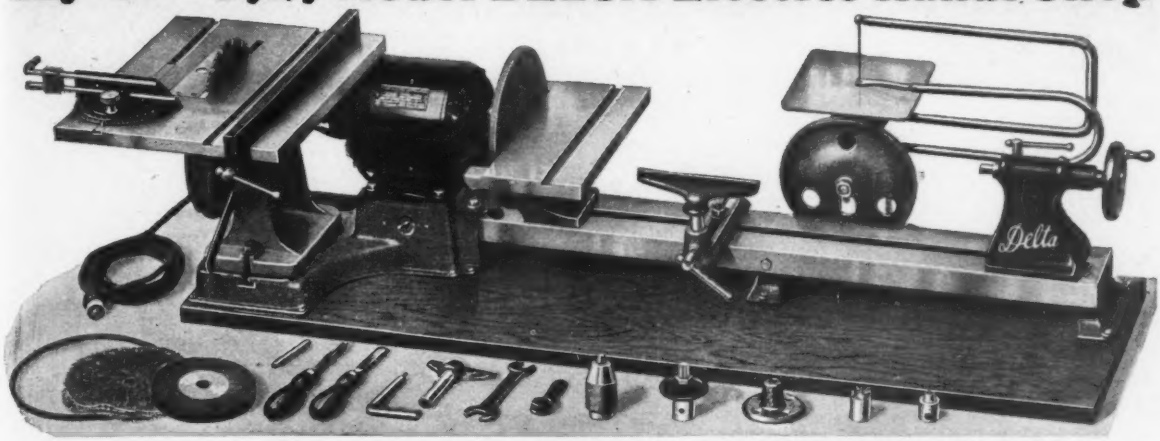
Offer Course in Retail Salesmanship in Trade School. A course in retail salesmanship has been added to the trade courses offered in the Girls' Vocational School at Newark, N. J. Under the arrangement, girls taking the course will be in the store one week, and in school one week, alternating through the school year for a period of from one to two years. The stores will pay for the time the pupils are in service. The course will cover English, art, merchandise information, and system study.

Cottage Built by Vocational Students. A six-room ,stucco cottage was recently erected in the Beverly Hills subdivision of Berkeley, Calif., by the Smith-Hughes vocational classes of the local high school.

The cottage was planned, sketched, constructed, and finished by the boys of the vocational carpentry class under the direction of Mr. John Morrill, instructor. The cottage is built on a hill commanding a view of the bay region, and contains six rooms and a bath. The dining room, living room, and reception hall are finished in Philippine mahogany, and the remainder in Oregon pine.

(Continued on page 49a)

20 New Big Superior Features in the 1929 Model DELTA Electric Handi-Shop



Here are just a few of the twenty New Features which, added to the many regular **exclusive** advantages of last year's model, make the New Delta Handi-Shop incomparable.

New Delta Miter-Gauge (with many new features)
New Circular Saw Adjusting Lever
New Delta Adjustable Rip Gauge
Larger Circular Saw Table
⅓ H. P. Motor
Larger, Triple Foundation Lathe Bed
½ inch capacity Drill Chuck

DELTA SPECIALTY COMPANY
1661-67 Holton St., Dept. M-128 Milwaukee, Wis.

EACH MACHINE in the "Delta Handi-Shop" is a full-sized, high-quality unit. Delta popularity rests upon the economy and convenience of employing a single high-grade **2 Shaft** Motor to drive any one of a number of individual machines. Investigate.

DELTA SPECIALTY CO., Dept. M-128,
1661-67 Holton St., Milwaukee, Wis.

.....Please send, without obligation, FREE illustrated literature describing new 1929 Model Delta Handi-Shop.

.....Please send me copy of "How to Make Things With a Workshop."

Name .....

Address .....

(Continued from page 46a)

With the exception of the foundation, plastering, and painting, the entire work was done by the boys of the vocational classes, under the supervision of the instructor.

Congress to Provide Money for Foremanship Training. A bill has been presented before Congress, which is intended to provide for an appropriation of $100,000 annually to the states, to be used with state money for the improvement of foremanship. The field of foremanship has grown enormously and there is a demand for more trained leaders in the industries.

Conduct House-Carpentry Class at Joplin, Mo. A class in house carpentry has been conducted at Joplin, Mo., with considerable success. A trade-analysis chart proved satisfactory in giving the boys a check on their experiences on the job, and providing a check against any chance of exploitation.

Related-Subjects Analysis Charts Useful in Trade Schools. Mr. C. L. Wetzel, supervisor of trades and industries in the Missouri state vocational department, has announced the completion of an analysis chart in related subjects. The chart follows an analysis of the trade for the selection of related material. Where the jobs are selected with care, an extensive list of related material may be accumulated and used for each particular trade.

The material may be organized into major topics and handled similar to the jobs in the shop. Each of the major topics may be expanded into a lesson which may contain several instructional units, properly divided and noted. The lesson sheet contains the elements of an instruction sheet, an assignment sheet, and a test or proficiency sheet.

The sheets are indexed and listed on an analysis chart under a particular title. The student assumes the responsibility for one of these related-subjects jobs, whether it be drawing, sketching, mathematics, or science. After passing the test on a particular related-subjects job, the student passes to another job. The record is kept on the chart, on the wall, in full view of the students, the teacher, and the school.

The analysis chart keeps before the teacher and the student the essentials which a student should know in order to become a good craftsman. He must know what to study, and he must know how nearly through the course he has progressed. The work may be conducted on an individual basis, supplemented by a few minutes each period on general review and drill on fundamental principles.

New Pay Schedule for Teachers in New York Trade Schools. The board of education of New York City has adopted a salary schedule for teachers assigned in charge of vocational or trade schools. The schedule provides for a minimum salary of $4,600 a year, and a maximum of $5,000 in the third year, with an intermediate rate of $4,800 a year. The schedule is known as 3-B and applies in all cases during the continuance of the assignment.

Federal Board Holds Regional Vocational Conference. At a recent regional conference held by the Federal Board for Vocational Education in Denver, Colo., an effective plan of vocational education was presented by Mr. L. B. Travers, assistant director of vocational education for Oakland, Calif. An outstanding feature of the Oakland plan is a reservoir training center to bring trainees up to the requirements of employers and to help students bridge the gap in making adjustments to their jobs.

Work of the Oregon School of Vocational Education. The school of vocational education of the Oregon Agricultural College, Corvallis, Oreg., under the direction of Dr. James R. Jewel, has accomplished some splendid work in industrial education during the past year. Prof. G. B. Cox conducted a course in trade analysis and another in the general shop and its problems, both of which attracted large enrollments. Miss Celia D. Shelton conducted a course in current problems in vocational education, which proved an inspiration to part-time and evening-school trade teachers in the state of Oregon.

New Developments in Oregon Trade Education. New developments in the trade and industrial program of Oregon for the coming year will include the establishment of part-time classes for plumbers' apprentices, and evening classes for journeymen in the trade at Salem, Eugene, and Astoria. A course for railway engine men, which will run for a period of six months, will include the city of Portland, Dalles, Pendleton, LaGrande, and Huntington. Many of the present day-school industrial classes, such as those maintained in the state on a cooperative part-time basis, will cover a wider field and a more complete type of vocational education. An enlarged program of industrial arts is proposed for the schools at Gresham, St. Helens, and Seaside, Oreg. St. Helens has established a beginner's course in manual arts, while at Seaside the manual-arts class is planning the erection of a community building to be used by the school district.

Would Establish County Vocational Board. Steps have been taken toward the establishment of a county vocational board in Westchester county, New York. The new board would have the work of investigating the needs of the county for the several types of industrial, home economics, and agricultural vocational education, and to undertake the provision of such forms of education as are deemed desirable.

WINDOW SHOPPERS GUIDE

NEW G-V PAINT SPRAYER

$2.00

Results with the G-V are as satisfactory as can be obtained with the most expensive spraying outfit. Variable from solid stream, heavy spray, or mist. Write for literature on Electric Power Sprayer.

G-V SPRAYER COMPANY,
Wichita, Kans.

Instructional Units in Wood Finishing

By McGee and Brown

Covers the basic processes and principles in the finishing of woods. In addition it offers several units in the field of interior decoration which are of practical value.

Contains Color Chart giving specific directions for the mixing and matching of color.

Price, $1.60

The Bruce Publishing Company
Milwaukee, Wisconsin

HUMPHREYS
No. 10 Oilstone
Variety Tool Sharpener

A hand tool sharpener that will sharpen both straight and irregular shaped tools correctly and keenly. A machine designed and built with all safety requirements for use in Industrial Schools.

IT HAS FIVE SHARPENING WHEELS

It has two 8" dia. x 2" face oilstones, one 8" dia. x ¾" grinding wheel, one stropping wheel, and one 3" dia. x 5" long cone wheel.

IT COMES COMPLETE WITH MOTOR AND SWITCH ALL READY TO RUN.

PRICE TO INDUSTRIAL SCHOOLS $125.00 F.O.B. Cincinnati, O.

Write for circular.

HUGH HUMPHREYS MACHINERY CO.
2324 Florence Ave., Cincinnati, O.

SHIP MODEL FITTINGS

Air Ports, Ventilators, Propellers, Anchors. Booklet 10 Cents. Refunded on First Dollar Order.

A. J. FISHER
1002 Etowah Ave.
ROYAL OAK, MICHIGAN

CRAFTWORKERS' SUPPLIES

Tools, Sheet Metals, Jewelry Fittings, Snap Fasteners, Etc.

Catalog on request.

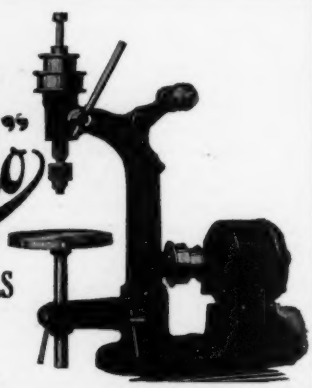
LEWIS & CO.
Est. 1902
P. O. Box 112 Watervliet, N. Y.

Blake TRADE MARK **Insulated Staples.**

For telephone, telegraph, annunciator, auto, radio, and other low-voltage wiring.

Blake Signal & Mfg. Co.
Boston, Mass.

For those who demand THE BEST "Buffalo" TOOLS



Complete details sent on request

Buffalo Forge Co.
482 Broadway, Buffalo, N. Y.

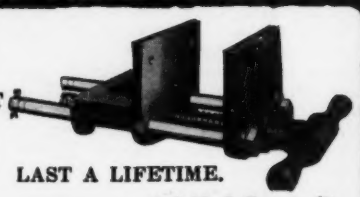
Our New Catalogue Is Ready For Distribution

Have you received your copy?

NATIONAL MANUAL TRAINING SUPPLY COMPANY
St. Paul, Minn.

MORGAN VISES
Solid Nut-Continuous Screw

THE SIMPLEST AND STRONGEST MANUAL TRAINING VISE MADE.



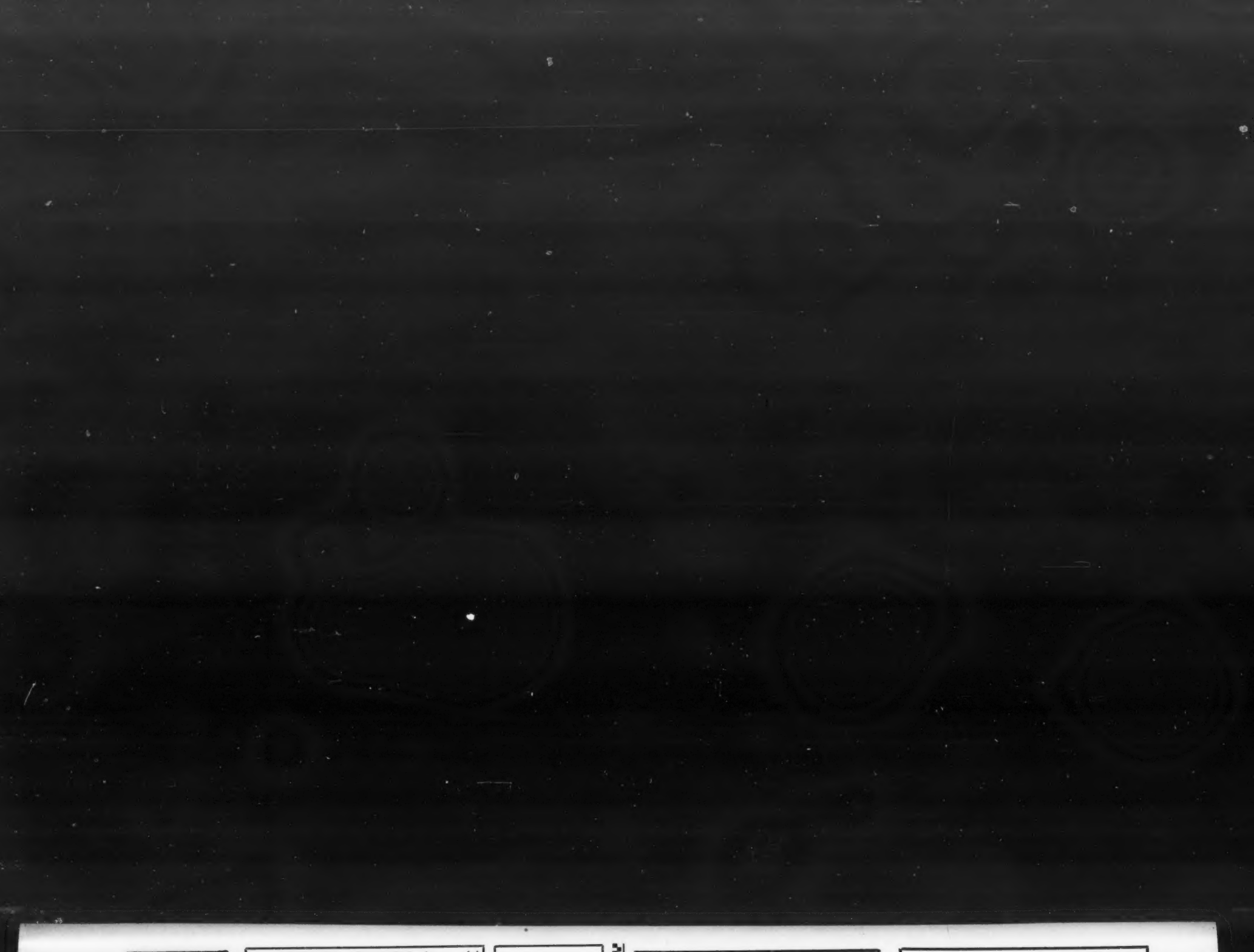
LAST A LIFETIME.

MORGAN VISE CO. 108 N. Jefferson St., Chicago
Pacific Coast Office—1360 So. Figueroa St., Los Angeles, Calif.

THE ORIGINAL AND GENUINE EXTENSION LIP AUGER BITS
ARE STAMPED

RUSSELL JENNINGS
on the round of each bit.

THE RUSSELL JENNINGS MFG. CO.
CHESTER, CONN., U. S. A.



NOV 19 1928

PERIODICAL ROOM
GENERAL LIBRARY
UNIV. OF MICH.

The INDUSTRIAL-ARTS MAGAZINE

DECEMBER 1928

THE-BRUCE-PUBLISHING-COMPANY
MILWAUKEE-WISCONSIN

Philadelphia Invites You to the A. V. A. Convention. Read Pages 423, 429, 459

SEE ATKINS SAWS ON DISPLAY

AMERICAN VOCATIONAL ASSOCIATION
MEETING DECEMBER 13-14-15

You are cordially invited to visit us in the Benjamin Franklin Hotel, Philadelphia,

Booth No. 28

to inspect the quality and learn of the service that can be had by installing Atkins Saws and other products for the school shop.

The world's largest Schools use Atkins Saws and Knives exclusively. That alone bespeaks the quality of Atkins Saws. They cost less and produce better work for the students.

Get your money's worth—demand Atkins Saws, Knives, Grinding Wheels, and Files.

Send for our NEW No. 20 Catalog if you do not have a copy

E. C. ATKINS & COMPANY

Established 1857 — *The Silver Steel Saw People*

Machine Knife Factory: Lancaster, N. Y.

Home Office and Factory: INDIANAPOLIS, IND.

Canadian Factory: Hamilton, Ont.

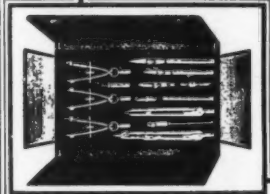
Atlanta
New York
New Orleans
Minneapolis
Seattle
San Francisco
Portland
Memphis
Chicago
Vancouver, B. C.
Paris, France

PEASE CHICAGO

The Pease "Junior" Blue Printing Machine and Sheet Washer—

A Special School Model Blue Printing Equipment.

Why not Modernize Your School Drafting Room?



No. 850 Schoenner 12-Piece Set

The Pease line of school drawing tables includes seven types in various sizes and styles.

TEACH your students how to make blue prints the modern way and if desired earn an income for your school besides, with the Pease Junior Blue Printing Equipment — equipped with a Pease Universal Arc Lamp that will operate economically on 110 Volt or 220 Volt AC or DC.

Speedy operation—perfect blue prints—durability and low price are only a few of the outstanding features of this new Pease Junior Equipment for school use.

The complete line of Pease School Drafting Room Supplies also includes Drawing Instruments, Drawing Boards and Tables, Filing Cabinets, Map Cases, and numerous other items. Clip and mail the coupon for your copy of Special School Catalog MJ 02X.

The C. F. Pease Company
802 N. Franklin St.
Chicago, Illinois

Mail Today

The C. F. Pease Company,
802 N. Franklin St., Chicago
Gentlemen:

Please send me School Catalogue MJ-02X, regarding Blue Printing Machinery, School Furniture, and Drawing Instruments.

INSTRUCTOR .....
SCHOOL .....
STREET .....
CITY..... STATE.....

PEASE
BLUE PRINTING MACHINERY

IS YOUR MANUAL TRAINING OUT OF DATE?

For Maintenance Work

Does it have the only sanding machine that embodies the newest, latest, and best?

Does it have the **powerful, fast-cutting** CLARKE Vacuum Portable Sander?

The only machine that does the work of the big Three-Drum Sander, the big Belt Sander, the Arm Sander, the big Floor Sander, and, in addition, does many things those sanders cannot do.

The only machine that is really dustless.

The only machine that is really portable, easy to operate, easy to work with — anywhere — anytime — from any convenient electric light socket.

It is safe in operation, peculiarly adapted to Manual Training use, and thoroughly instructive of the best in woodworking.

POWERFUL - FAST CUTTING
CLARKE
VACUUM PORTABLE SANDER

In Manual Training

KEEN MINDS IN CHARGE OF MAINTENANCE

Keen minds in charge of maintenance work have been quick to grasp the useful, labor-saving qualities of the **powerful, fast-cutting** CLARKE Vacuum Portable Sander.

And have put these easy-to-operate machines to work making old desk tops new, giving to each Mary and Jimmie a smooth writing surface, turning battle-scarred desks into good-looking, useful furniture, and

IT IS NEVER TOO LATE

No need of postponing this important work until another vacation period. No need of regretting the fact that the writing surfaces are not now what they were intended to be. Maintenance men have taught us the easier, simpler, less troublesome method.

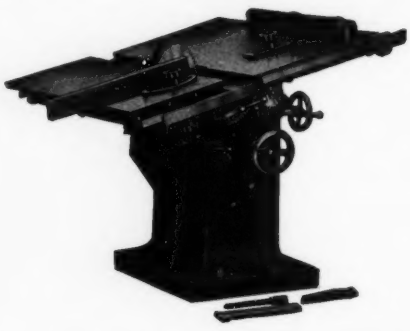
Over the week end, one man with one CLARKE Vacuum Portable Sander, does the work of a crew of men.

Let us show you, without cost or obligation, more about this truly helpful, soundly instructive, and needful labor-saving machine.

WRITE TODAY.

CLARKE SANDING MACHINE CO.
Dept. H-212, 3822 Cortland Street, Chicago

Originators, and for over eleven years manufacturers, of Portable Sanding Machines.



The No. 10 Crescent Saw Table is a sturdy, substantial machine with every convenient adjustment for general factory work and will meet every requirement for a practical saw table with self-contained motor for your manual training department.

Send today for circular giving complete description. Also ask for circular of band saws, saw tables, shapers, jointers, variety wood workers, planers and matchers, disk grinders, cut off table, swing saws, borers, hollow chisel mortiser, tenoner, universal wood workers, self-feed rip saw.

THE CRESCENT MACHINE CO.
25 Main St.,
LEETONIA, OHIO.

No. 185 MOTORIZED Band Saw

Features

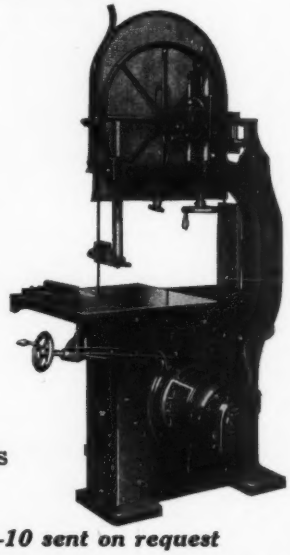
Ball Bearing.

Motor mounted on lower wheel shaft.

Push button control.

Anti-friction Guides.

Built in two sizes 30″ and 36″.



Bulletin IA-10 sent on request

HALL & BROWN WOOD WORKING MACHINE CO.
Broadway, Tyler, Ninth Sts., St. Louis, Mo.

The world's largest file user protects you as a file buyer

Better Hack Saws—Better Blades

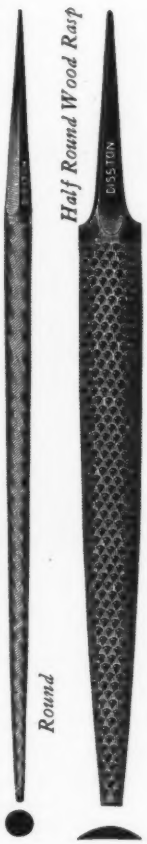
Disston Hack Saw Frames are standard equipment in school shops everywhere. No. 36½, illustrated, has steel frame adjustable from 8 to 12". Stretchers cannot fall out when changing blades. Hardwood handle is placed to give correct thrust for easy work.

Disston Hack Saw Blades are made of a tougher, harder, more durable steel developed in the Disston Steel Works. They enable the school shop to do fast, accurate work.

Disston Kutkwik Tool Holder Bits

Made of high-speed alloy steel, scientifically hardened for industrial machine shop practice.

Hold their edges longer under overloads and unusual strains of school metal shops. Widely used in lathes, shapers, planers. Sizes 3/16", ¼", 5/16" square, 2½" long, ⅜" square, 3" long. Larger sizes available. Send for interesting booklet, "Tool Steel."



ONLY when you buy *Disston* Files can you get files made of the same steel, by the same men, with the same care, as the files that are used in making Disston Saws.

These files must have the steel, temper, and bite that skilled saw-filers demand; they must have long life to keep costs down. They *must* be right . . . *and they are!*

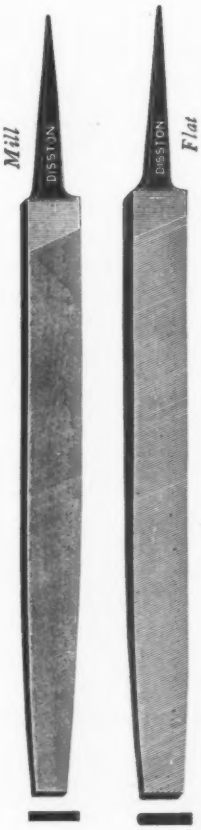
No other guarantee could insure you such quality as our daily use of our own product.

In your school shops you want efficient files—for the metal-worker, for the wood-worker. There is a sure way to get them. Write for prices and information and—

Be Sure to Specify

DISSTON FILES

HENRY DISSTON & SONS, INC.,
Philadelphia, U. S. A.
CANADIAN FACTORY: TORONTO



"We use Starretts at school - too!"

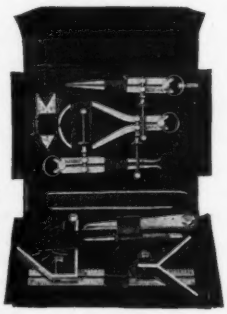
The use and ownership of genuine Starrett Tools brings an expression of pride from the young fellow as well as the old timer.

The Starrett Apprentice Set No. 900 contains just the tools the beginner needs—each one of them a genuine Starrett, good for a lifetime of accurate service.

Ask your dealer to show you the Starrett No. 900 Apprentice Set. Write for copy of the Starrett Catalog No. 24"CE" illustrating and describing more than 2500 fine tools.

The Starrett Book for Machinists' Apprentices, Volume 1 of the famous Starrett Books, contains answers to the many questions the beginner will ask. Every apprentice should have this book.

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
ATHOL, MASS., U. S. A.



Starrett Apprenticee Set No. 900, in a handsome folding leather case, is made up of 6 inch Combination Square, complete; center punch, 6 inch flexible steel rule in pocket case, center gage, 4 inch caliper, 4 inch inside and 4 inch outside calipers with solid nuts, and 4 inch dividers with solid nut.

Use Starrett Tools

2359

Especially Designed for the SCHOOL SHOP

RHODES SHAPERS SLOTTERS

RMCo

Economical in Original Cost

The Rhodes Crank Shaper, Slotter, or Combination Shaper and Slotter costs one half as much as a large machine. It meets school requirements as *no* large machine can. And as for accuracy, dependability, and *ability to turn out real jobs,* consider this—one large electric manufacturer employs over 100 Rhodes Shapers and Slotters in their Tool Rooms alone.

Investigate these remarkable school machines. Simply write your name and address above this ad and mail to–

The Rhodes Manufacturing Co.
Hartford, Conn., U. S. A.

No cutting tool is better than its edge
Keep the tools sharp

PLURALITY OILSTONE TOOL GRINDER

THE most convenient, serviceable and efficient tool sharpening machine ever made.

This new Tool Grinder has been carefully designed to combine many new advantages with the essential features of older models. It combines five basic units in one machine: *coarse oilstone wheel, fine oilstone wheel, grinding cone, leather stropping wheel, emery wheel,* and all accessible from two adjacent sides.

It is motor driven, ball bearing throughout, and every unit is thoroughly guarded.

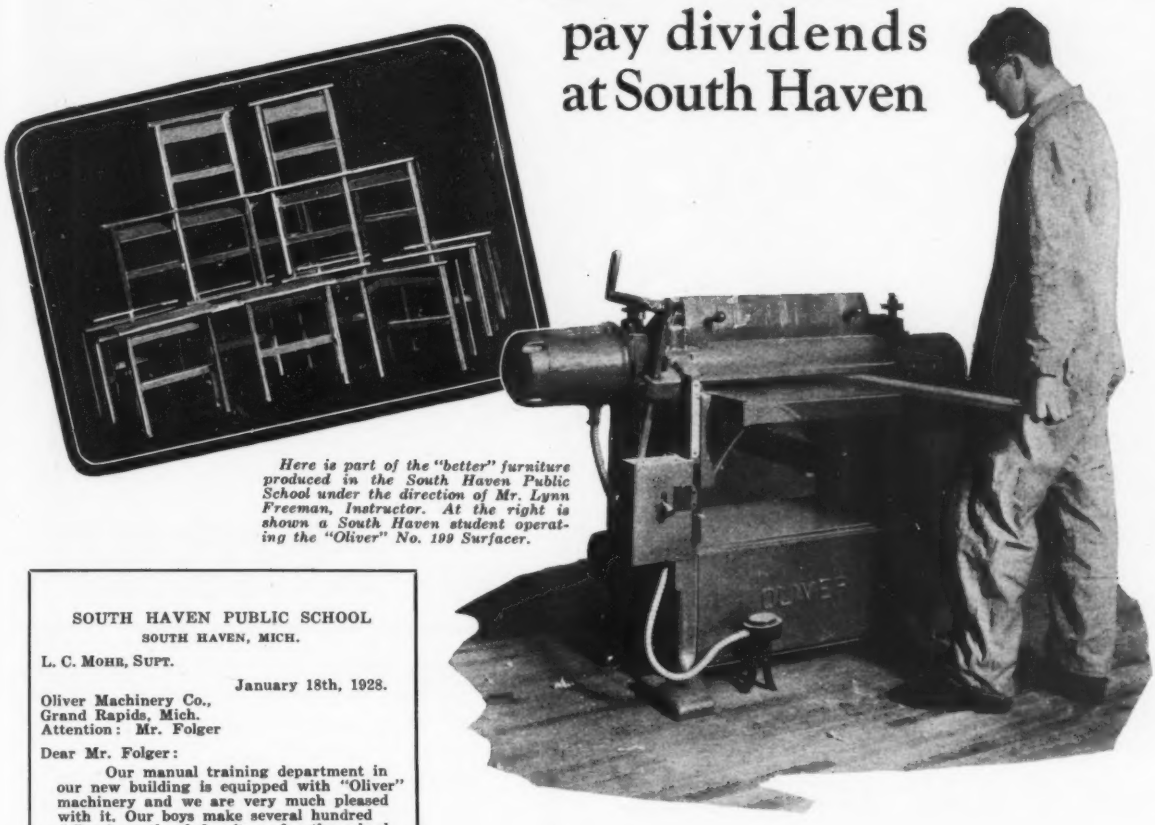
Write for full descriptive bulletin.

MUMMERT-DIXON CO.
Hanover, Pa.
Originators and Pioneer Manufacturers of Oilstone Tool Grinders

"We appreciate the Splendid Service"

writes L. C. Mohr, Sup't. of Schools

"Oliver" Machines pay dividends at South Haven



Here is part of the "better" furniture produced in the South Haven Public School under the direction of Mr. Lynn Freeman, Instructor. At the right is shown a South Haven student operating the "Oliver" No. 199 Surfacer.

SOUTH HAVEN PUBLIC SCHOOL
SOUTH HAVEN, MICH.

L. C. MOHR, SUPT.

January 18th, 1928.

Oliver Machinery Co.,
Grand Rapids, Mich.
Attention: Mr. Folger

Dear Mr. Folger:

Our manual training department in our new building is equipped with "Oliver" machinery and we are very much pleased with it. Our boys make several hundred dollars' worth of furniture for the school each year and it is better furniture than we can purchase on the market for our purpose. The machinery is easy to operate and we have never had an accident with it outside of a few minor cuts.

We appreciate the splendid service you have given us in the sharpening of knives and saws and also in taking care of the few minor repairs that have been necessary. I really am very much pleased that we completely equipped with "Oliver."

We will take a picture in the spring of our output for the year and send it to you. It is surprising the amount of excellent furniture that can be made by a class of boys.

Yours sincerely,
(Signed) L. C. Mohr,
Supt. of Schools

LCM:NW

BAND SAWS
SAW TABLES
JOINTERS
SURFACERS
MORTISERS
AND ALL OTHER
WOODWORKING MACHINERY

"Oliver" Service goes with "Oliver" Machines

One year—five years—twelve years after you put a machine in service is the time to judge it and the company behind it. Purchasers of "Oliver" machinery are pleased to discover that "Oliver" Service is in keeping with the quality of "Oliver" machines. Whether you have a single "Oliver" machine or complete "Oliver" equipment, you will find we are able and willing to cooperate—always.

The No. 199 "Oliver" Single Surfacer shown above is a favorite in school shops. It will surface up to 24 inches wide and 6 inches thick at the rate of 32 feet per minute, producing a perfect, smooth surface. It is ordinarily furnished with Motor-on-Head drive, but like all "Oliver" machines, any standard drive may be had.

Oliver Machinery Co.

Grand Rapids, Mich.

Made for manual training schools . . . . . .

Maydole No. 12½ Adz Eye Nail Hammers were made especially for use in manual training shops. Their balance, toughness and built-in resistance to wear makes them outlast any ordinary hammer.

Press-forged tool steel heads; clear, second growth air dried hickory handles that have been put into the heads "for good",—real hammers all the way through that will stand a tremendous amount of use or abuse.

Your dealer carries a complete stock. Ask him to show you the styles and weights you need. Write us for a free supply of Pocket Handbooks 23 "H".

YOUR HAMMER SINCE 1843

Maydole Hammers

The David Maydole Hammer Co., Norwich, N.Y.

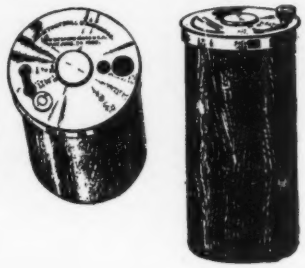
2404

One Drill at a Time

is ALL that you can extract from these index cases—

BUT YOU ALWAYS GET THE SIZE INDICATED ON THE DIAL

These cases are used largely for straight shank drills, but we have a very handy set of Bit Stock Drills.



No. 13A

1/16" to 1/4" x 32nds
1/16" to 3/8" x 16th
which we stock in this style case —

Order now and conserve your time as well as your drills.

MORSE
TWIST DRILL & MACHINE CO.
NEW BEDFORD, MASS., U.S.A.

THE JOHNSON FRICTION CLUTCH

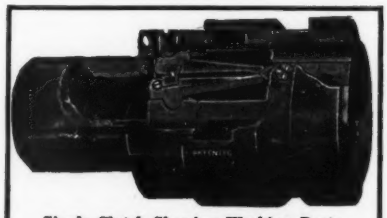
Experience Proves that

Johnson Clutches

are splendidly adapted

For Use in Schools

On lathes, band saws, and various other light-powered machines in manual training departments the JOHNSON Clutch gives admirable service. This clutch is in nation-wide use in public and private schools, and gives highest satisfaction wherever used.

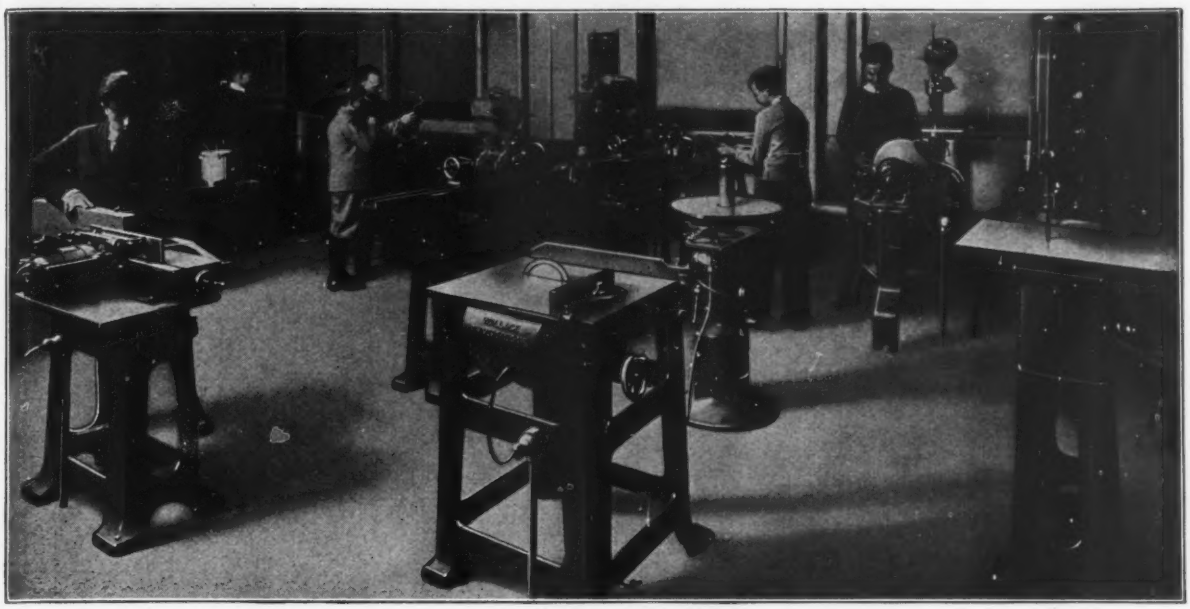


Single Clutch Showing Working Parts

For twenty-five years we have been supplying our clutches to the schools of America. This experience COUNTS. Anything a school needs in clutches—we have it. Thousands of illustrated 7 x 10 reprints describing installations. Equip with JOHNSONS.

Write for Catalog "IAM"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.



The above photograph shows the completely Wallace Equipped Training Shop of the New Rochelle Junior High School, New Rochelle, New York.

Boys quickly learn to do accurate work with Wallace Portable Machines

VERSATILITY. The motor is an integral part of each machine. No belts to slip—so no waste power—plenty of it for all shop woodworking. Wallace Machines are designed and constructed to meet every woodworking requirement.

PORTABLE. You can move any Wallace Machine anywhere quickly and easily. Just plug it into any nearby electric light socket. Surprisingly small floor space is required.

ACCURACY. What the average school training shop needs is light, portable cabinet-making equipment — Wallace Machines. They are powerful enough to do the heaviest job, accurate enough to do the finest work with infinite precision.

SAFETY. Boys of school age can stand naturally with both feet firmly on the floor and work with Wallace Machines without leaning dangerously off balance over a wide table. Wallace designs are compact. Every blade is guarded. Youthful operators run no risk. (Safety guards, wiring, and plugs are approved as standard by Underwriters Laboratories.)

ECONOMY. The initial cost of Wallace Machines is small. No installation expense—upkeep negligible. It will pay you to examine the Wallace catalog, regardless of the funds available for school equipment.

FREE TRIAL. Send for the Wallace catalog. We'll let you try any machine, cost free, without obligation. If, after a week's trial, you are not convinced, send it back, charges collect. Get all the details of the trial offer. We'll put you on our mailing list for the Solar-Wallace Plan Service for Instructors, including illustrated job sheets that you can use as regular assignments. Write today.

Complete outfit including planer, saw, lathe and electric motor, and many useful attachments.

Complete all-inclusive outfit, safe for boys to work with. Fast. Accurate. Costs less than most workshops and embodies all the practical features that have won distinction for individual Wallace Portable Machines in business and industry . . . Every unit works direct from the motor. Boys find it easy to do any kind of woodworking operation with the Workace . . . Sold on easy terms. Write today for details.

SPECIAL NOTICE TO INSTRUCTORS

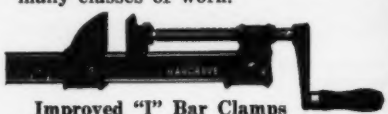
Many manual training pupils are prospects for the Workace and other Wallace Machines. Woodworking shops are prospects, too. Act as our special sales representative in your spare time and make good money. Write for particulars.

J. D. WALLACE & COMPANY
140 S. California Ave., Chicago, Ill.

USE GOOD CLAMPS

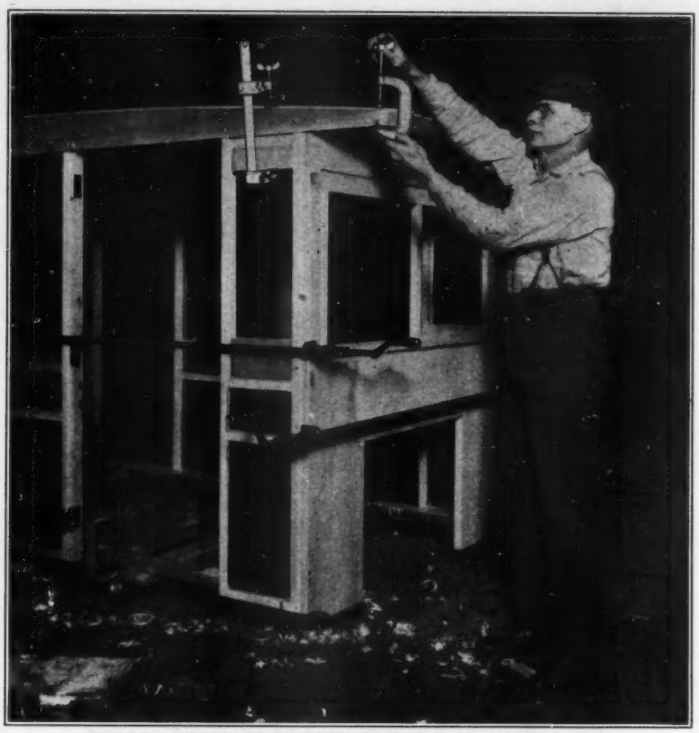
Steel Spindle Hand Screws
Strong - Durable - Satisfactory
Jaws are selected hard maple. Spindles have deep cut "Acme" thread, insuring long life to the bearings. Handles are fluted, giving good grip.

Quick Clamps (Patented)
Made in nine patterns, six depths and any size opening. They are replacing the old style clamps for many classes of work.

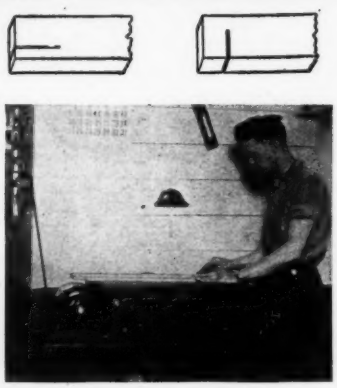


Improved "I" Bar Clamps
Exceedingly strong and powerful for their weight. They have a number of patented features of superiority.

Write for catalog showing a Clamp for every purpose and many other improved mechanics' tools which should interest you. Your jobber can supply "HARGRAVE QUALITY" Tools.



THE CINCINNATI TOOL COMPANY
Established 1879
Incorporated 1884
Waverly and Main Aves.,
CINCINNATI, OHIO



H & A—the Practical Woodworking Tools For Your Shop

SO reasonably priced there is no reason why you should be without a full equipment of power tools; so thoroughly practical and sturdy you couldn't buy better if you paid many times the price. Safe for students' use. Portable; electric. Used by thousands of schools and industries.

Write for Catalog of

Band Saws	Scroll Saws
Rip Saws	Lathes
Jointers	Shapers
Cut-off Saws	Glue Pots

HESTON & ANDERSON
312 Western Ave., Fairfield, Iowa

Huther Bros.
Dado Head

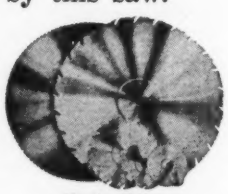
You need a Huther Dado Head

The saw that makes intricate cutting and grooving simple.

This saw, developed from our own patents, consists of two outside cutters and a sufficient quantity of inside ones to perform the required cut. The outside cutters can be used singly or in pairs as required.

Every builder or contractor, wishing lock corners or any sort of grooving, will find his production costs lowered by this saw.

Write for complete information and prices, or send for one on approval. It may be returned at our expense if unsatisfactory.



Huther Bros.
Hollow Ground Saw

HUTHER BROS. SAW MANUFACTURING COMPANY
Rochester, N. Y.

Makers of Better Saws for More Than 50 Years.

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

It is your example that counts

THE importance of using excellent materials, and the thriftiness of purchasing them systematically are two of the most valuable lessons you can teach. The boy who is impressed with the ideal of quality workmanship in his formative years will not be tempted by cheap, inferior goods of life later. And, guided by your example of advantageous buying, he will not waste time and money haphazardly.

For these reasons, 9 out of 10 vocational instructors believe that the advisability of using Johnson's Wood Dyes and other interior finishes cannot be too strongly emphasized. The finest made, they are a continual incentive to praiseworthy effort. And as a concrete example of true economy our special School Assortment offers a beautiful object lesson. Thus the ambitious instructor is provided with a double opportunity to build character and contribute toward the material success of his pupils.

JOHNSON'S INTERIOR FINISHES

Wood Dyes — Waxes — Varnishes — Enamels — Fillers

New Wood Finishing Text Books — FREE

Our recently published text book, prepared by recognized authorities, presents the latest and best practice in wood finishing. Every step is clearly and simply outlined. Sufficient copies for entire classes will be sent without charge to all users of Johnson's Finishes. Return coupon for specimen copy and price list.

---------- **mail coupon now** ----------

S. C. JOHNSON & SON, Dept. I A 12, Racine, Wis.
"The Interior Finishing Authorities"

Please send me a copy of your Wood Finishing Text Book and all information concerning your Special School Assortment of Johnson Finishes.

Name.....

Position.....

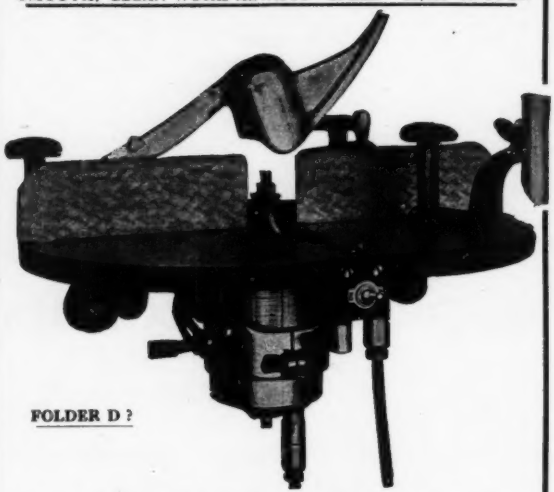
School.....

City..... State.....

BE PROUD OF
YOUR
STUDENTS' WORK

All That You Need to Put Out Finished Work Are These Two Machines

SMOOTH, CLEAN WORK ALWAYS—SPEED 18,000 R. P. M.



FOLDER D ?

1/4 H.P. Shaper and Jointer. Runs from any light socket.
Price Complete (except cutters) $121.00
Floor Pedestal $18.00 Extra

Over 800 Schools and Colleges are now equipped with these wonderful machines.

START NEXT YEAR RIGHT.

Write for Requisition blank and suggestions.

Valuable router and shaper chart will also be sent if requested.

1/7 H.P. Router. Runs from any light socket.
Price $46.50

FOLDER C ?

THE R. L. CARTER CO., INC.
1210 Chestnut St., Phoenix, N. Y.

Doing Two Jobs

Is one reason why so many schools own the TAKE-ABOUT Sander. Put it in the shop and you speed up instruction. It makes the work more interesting for the student by eliminating much tedious handsanding and scraping. So simple a child can use it. Snap the switch, let the belt work, just guide it. On the other job, it pays for itself refinishing desks, blackboards, and trim—being five to ten times faster than hand. The larger SUPER Model is particularly adapted to this work. The Bench Stand converts the TAKE-ABOUT into a tool or edge grinder.

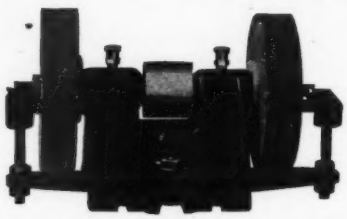
You should know more about the uses of this machine for schools and industry.

TAKE-ABOUT Sander

See our Exhibit A. V. A. Convention Philadelphia, December, 13-15, Booth 47

PORTER-CABLE MACHINE CO.
1702 N. SALINA ST., SYRACUSE, N. Y.

JUST RIGHT FOR TOOLS!



LUTHER POWER GRINDER

This 6″ bench tool grinder may be operated satisfactorily with a ¼ H.P. Electric Motor mounted on a portable platform or fastened on the bench.

The cost is surprisingly low—you can get a complete grinder for the usual price of a pair of extra wheels.

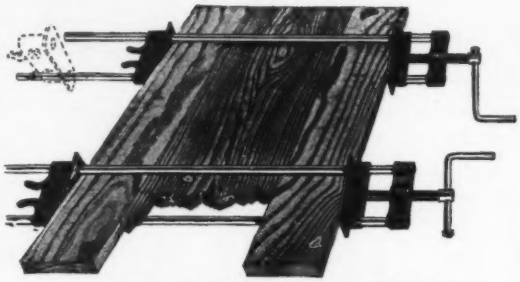
Finish and construction is good, which insures longer service. A medium and coarse grit vitrified grinding wheel covers all general grinding and sharpening work.

Luther grinders can be purchased from any good dealer or supply house.

LUTHER GRINDER MFG. CO.
291 So. Water St.,
MILWAUKEE, WIS.

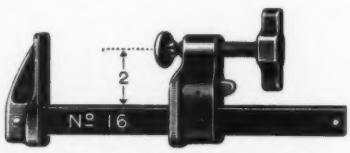
Standardize on Hartford Clamps

"HARTFORD" SINGLE AND DOUBLE BAR CLAMPS PROVIDE A CLAMP FOR EVERY USE.



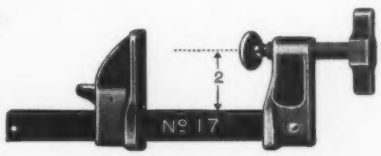
No. 3 Double Bar self-locking and unlocking clamp. Note how the bars keep work from buckling.

When Hartford clamps were first made there were few models. But because these few models made it easier for woodworkers to clamp work and with less fear of spoilage, school men asked us to fill out our line. Now there is a Hartford clamp suitable for every use in the school shop. For your aid in requisitioning we have attempted to illustrate here as many Hartford clamps as space permits.

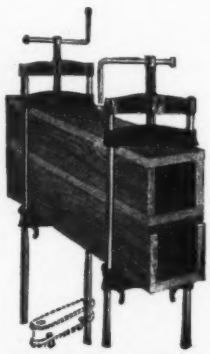


No. 16 is light in construction but strong. The screw end of this clamp is adjustable.

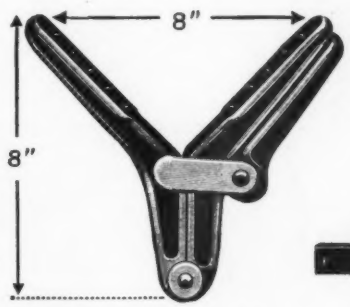
No. 5 is most popular. Of medium weight and extra strong.



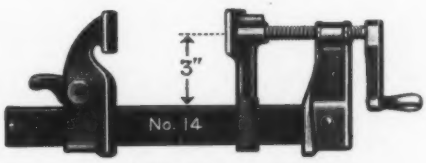
No. 17 is strong though lightly constructed. Screw end is stationary while tail end is movable.



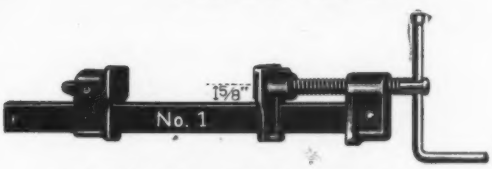
No. 6 is extra heavy. Efficiently does the work of a press up to 6½" thickness.



Mitre clamp, with planed off jaws and hardened steel pins.



The No. 14 is rigid in construction with a reach up to 3 inches.



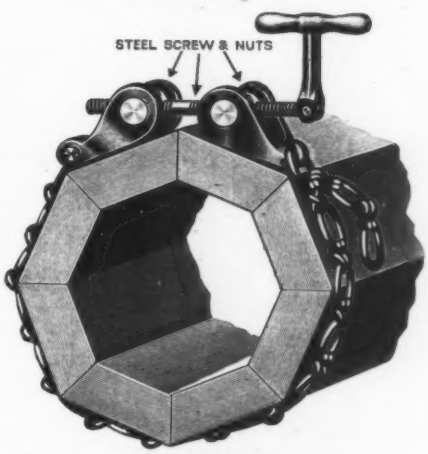
No. 1 is for lighter work but pressure obtained from it will surprise you.

On all except the mitre and column clamps we have a special patented locking device. This locking device does away with much needless effort in clamping. You are able to slip the clamps on the work and firmly grip it while your glue is at the right temperature. Try out a Hartford and notice how much better the joints will hold together and how much neater your work looks when finished.

Before specifying be sure to get the Hartford catalog listing all our clamps. Write now.

HARTFORD CLAMP CO.

BURNSIDE, CONN.



Column clamp No. 75. Takes all work up to 16" diameter. Has powerful screws.

BEST SAWS FOR SCHOOL USE

When you equip your shop with SIMONDS SAWS — Band, Circular, or THE PLANER SAW — you are not only assured of a lasting service, but smooth-cutting, edge-holding saws. Schools in every section use them and find they give the most satisfaction.

The Planer Saw

SIMONDS PLANER SAW is available in sizes from 6 inches up. This is the saw that cuts practically as smooth as a planer knife.

Write us about your saw requirements

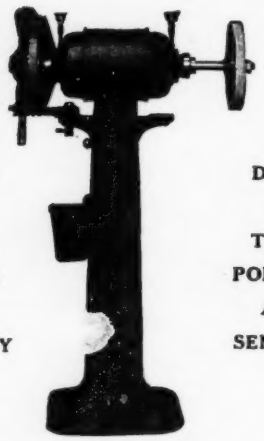
SIMONDS SAW AND STEEL COMPANY

"The Saw Makers"

ESTABLISHED 1832 — FITCHBURG, MASS.

Chicago, Ill.
Boston, Mass.
Detroit, Mich.
New York City
New Orleans, La.
Lockport, N. Y.
Memphis, Tenn.
Atlanta, Ga.
London, England
Portland, Ore.
San Francisco, Calif.
Los Angeles, Calif.
Seattle, Wash.
Montreal, Quebec
Toronto, Ont.
Vancouver, B. C.
St. John, N. B.

AN IDEAL COMBINATION GRINDER AND BUFFER FOR YOUR SHOP



GRINDERS ALL SIZES PORTABLE AND STATIONARY

DRILLS ALL TYPES PORTABLE AND SENSITIVE

Write for complete catalog and list of schools using "CLARK" Tools.

Jas. Clark, Jr., Electric Co., Inc.

630 E. BERGMAN
LOUISVILLE, KY.

The **Reid-Way** ONE *moving part!*

Vacuum Convertible Sander

The ideal light sanding machine for manual training or maintenance work. The revolving field motor—exclusive Reid-Way feature, has no belts, chains, or gears; only one moving part—the sanding drum itself. New vacuum principle eliminates dust. Extreme simplicity brings the price of this machine within the reach of every shop.

Write for circular describing the new Reid-Way.

THE REID-WAY COMPANY

766 North 16th STREET
CEDAR RAPIDS, IOWA.

FOLEY AUTOMATIC SAW FILER

Keeps School Saws in Perfect Condition

NO MATTER how bad your saws may be, the Foley will file them AUTOMATICALLY (and retooth if necessary), with such mechanical accuracy that they will cut faster, truer, and cleaner. Eliminates the tedious work and eye-strain of filing by hand, and your saws will stay sharp longer, too. Foley-filed saws will improve your students' work.

The Foley Automatic Saw Filer is used and highly endorsed by many schools the country over. Just read what these Schools say—

See the FOLEY
at Booth 451 at the American Vocational Convention Exhibit in Philadelphia, Dec. 13-14-15.

Indiana State Normal School
Terre Haute, Indiana

Foley Saw Tool Co., Inc.
Minneapolis, Minn.

Gentlemen:—

Have been using Foley Saw Filing Machine for about 2 years, and keep our saws in first class condition. The saws cut cleaner, truer, and faster than they have ever cut before. Would not be willing to be without the Foley for several times its original cost if we could not get another like it.

M. L. LAUBACH
Dept. of Ind. Arts.

SAGINAW PUBLIC SCHOOLS
Saginaw, Michigan

Foley Saw Tool Co., Inc.
Minneapolis, Minn.

Gentlemen:—

I do not see how any school can get along without a Foley Automatic Saw Filing Machine if they wish to keep their saws sharp, which I consider essential.

ERIC S. WESSBORG,
Asst. Supt. & Voc. Dir.

SENIOR HIGH SCHOOL
EVERETT, MASS.

Foley Saw Tool Co., Inc.,
Minneapolis, Minn.

Gentlemen:—

I am very much pleased with the Foley Automatic Saw Filer. It does perfect work and is operated by boys in my classes. We have real sharp and clean-cutting saws now. Besides our own saws, we file the saws for the other schools in the city.

CHARLES W. HURN
Inst. of Woodworking.

Board of Education
Manual Training Dept.
Minneapolis, Minn.

Foley Saw Tool Co., Inc.
Minneapolis, Minn.

Gentlemen:—

This department has under its care 2000 saws of all kinds which are in constant use. The Foley Automatic Saw Filer has enabled us to file in 15 minutes a band saw which took 2 hours to file by hand. Other filing time has been reduced by one-half.

We have found the Foley exceedingly satisfactory.

A. W. TAYLOR
Voc. Facilities Inspector.

30 Day FREE TRIAL

We want you to satisfy yourself that the Foley will file your saws better than they have ever been before. Try it on your cross-cut, rip, back, mitre box, panel, and other hand saws, band saws from ⅛" to 4½" wide and circular cross-cut from 3" to 16" diameter. If it doesn't beat hand-filing a mile, you may send the machine back. No obligation.

FOLEY
Saw Tool Co., Inc.
431 Foley Bldg., 11 Main St. N.E.

Please send complete information about the Foley Automatic Saw Filer and 30 day FREE TRIAL Plan.

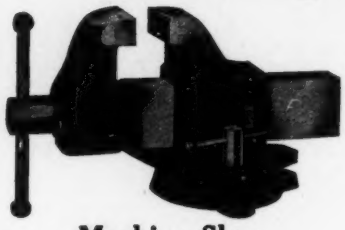
Name .....

Street .....

City..... State.....

COLUMBIAN VISES

Wood Shop



Machine Shop

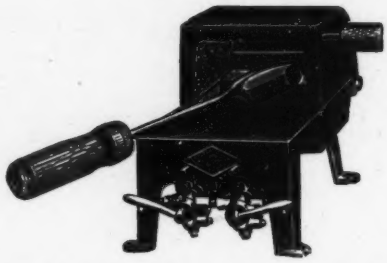
A vise for every need.

In Schools or Industry.
Columbian Vises standard equipment.

Will gladly send literature and prices.

The Columbian Vise & Mfg. Co.
Cleveland, Ohio

THE FAMOUS NO. 101 BENCH FURNACE BY JOHNSON



The popularity of this famous bench furnace is well justified. It is a marvel of efficiency, and once it is used in any shop requiring such service, it will be deemed indispensable. It is inexpensive. Will heat soldering coppers up to 12 lbs. per par. Also used for heat-treating, tempering, etc. No blower needed. The two powerful Johnson Bunsen Burners supply quick, intense heat. Write for full details.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

THIS Company is the largest and oldest manufacturer of a complete line of high grade

KEYSTONE COPPER STEEL
For Rust-resistance!

STEEL

BLACK AND GALVANIZED SHEETS,
Corrugated Sheets, Formed Products, Full Finished and Auto Sheets, Special Sheets, Tin and Terne Plates, Black Plate, etc., adapted to every purpose. Sold by leading metal merchants. Send for interesting booklets.

SHEETS

AMERICAN SHEET AND TIN PLATE COMPANY, Pittsburgh, Pa.

DISTRICT SALES OFFICES: Chicago, Cincinnati Denver, Detroit, New Orleans, New York Philadelphia, Pittsburgh, St. Louis
Pacific Coast Representatives: United States Steel Products Company, San Francisco Los Angeles, Portland, Seattle
Export Representatives: United States Steel Products Company New York City

When You Think of Supplies

For Your Sheet Metal Working Course

THINK OF

BERGER BROS. CO.

You don't have to shop around when you buy of us. We carry everything from a rivet to the largest machine used for this work.

Ask Any Sheet Metal Worker

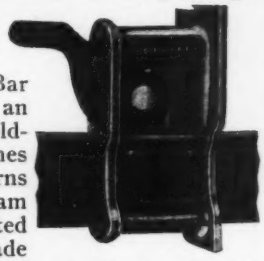
If you are not equipped to teach this course you should investigate. The sheet metal industries need skilled labor and need it bad. The work is healthful, the hours short, and the wages high. Let us send you literature on the subject.

DISTRIBUTORS FOR
PECK, STOW & WILCOX CO.'S
Line of Tools and Machines

BERGER BROS. CO.

229-231-233-235-237 Arch St.
PHILADELPHIA

The Greater the Pressure the Better the Clamping Efficiency

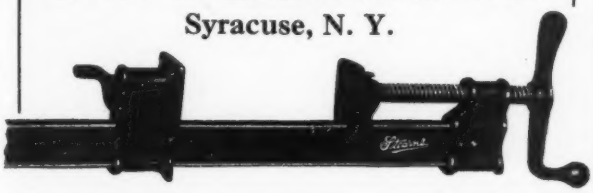


The Stearns "I" Bar Carpenter's Clamp is an improvement over the older types. Instead of notches on the bar this Stearns Clamp has a special cam locking device, illustrated above. The cam is made of special tool steel and has teeth at point of contact with bar. These teeth grip when pressure is exerted and the more pressure exerted the firmer the grip bcomes. Consequently the completed project is stronger and better looking.

Further details on this and our other clamps on request.

E. C. STEARNS & CO.

Syracuse, N. Y.



Write for free booklet about this High Speed Lathe

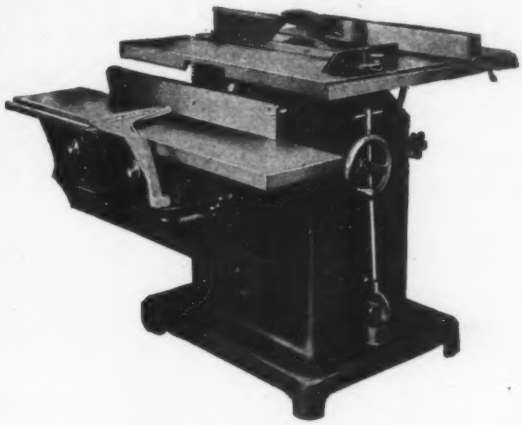
COMPACT, complete, efficient—No. 1018 Lathe —of variable speed, meets the rigid requirements of industrial schools and aids instructors to get maximum results from their students.

The bed is cross-girted with brackets which form a knife edge on top to prevent holding dirt or shavings.

The cabinet legs are skeleton type, attractive design, strong, staunch, and rigid.

The motor has four speeds, ranging from 600 to 3600 R.P.M. **The control** is built on top of the motor and fully enclosed. The various speeds are obtained by a convenient handle within easy reach of the operator.

THE AMERICAN SAW MILL MACHINERY CO.
74 Main Street, Hackettstown, N. J.
Makers of Woodworking and Saw Mill Machinery



TWO MACHINES IN ONE

This new machine, designed and manufactured by the Gallmeyer & Livingston Company, is the Motor on Arbor Saw and the Eight Inch Jointer all in one.

You can readily see the great advantage to schools in having a single machine serving a dual purpose. It saves floor space, cuts operating cost in two, eliminates belts, belt replacements, and gears that are often dangerous when students are operating.

It will operate from any light socket, or if preferred can be furnished with power line motor. In every respect this new machine is exactly suited for schools. A machine no school can afford to be without. We will gladly give you any additional information on request. Get the facts about Gallmeyer & Livingston's new Combination Motor on Arbor Saw and Eight Inch Jointer.

Send For This Catalog It's FREE

GALLMEYER & LIVINGSTON CO.

214 Straight Ave. Grand Rapids, Mich.

...for real work Get a Parks!

See this Parks machine at the American Vocational Association Convention in Philadelphia, December 13, 14, 15.

"Carpenter Shop Special" *Equipped with Ball Bearings*

$495

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

PARKS

WOODWORKING MACHINES

The newest, handiest Parks—the "Carpenter Shop Special"—gives you more useful units, more convenient arrangement, and more space-saving compactness. 18-in. band saw; 9-in. jointer; 16-in. lathe; 10-in. circular saw; hollow chisel mortiser; quick reverse spindle shaper; independent drive on every unit; equipped with ball bearings; every useful adjustment; 2 h.p. motor.

Write for circular.

The Parks Woodworking Machine Co.
1605 Knowlton St. Cincinnati, O.
Canadian Factory:
338 Notre Dame East, Montreal

Train your boys on a

SOLEM PLANER

and give them *real* shop practice

The SOLEM PLANER does fine work on even the smallest pieces used in the school shop. Even the most expensive planers can do no better work. It is ball-bearing and motor driven and in both design and size especially suited to school use.

SOLEM MACHINE CO., Rockford, Illinois

SOSS

Invisible Hinges

(Good Taste + Strength)

Completely invisible when the door is closed. Flush doors—clean lines—no projections. Admittedly the ideal hinge for discriminating work.

A style for every use

See our catalog in Sweet's (pages 1578-9), or write direct to us for samples and complete catalog.

Soss Mfg. Co., Inc.

Grand Ave. and Bergen St.,
BROOKLYN, N. Y.
Detroit Office
1951 Book Bldg.,
Washington Blvd.

LITTLE GIANT

Grinding is an essential operation and students are best trained with "Cleveland" Grindstones because when they enter industry they will find "Cleveland" Grindstones in practical work.

THE CLEVELAND STONE COMPANY

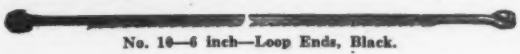
UNION TRUST BLDG. CLEVELAND, OHIO
283 Front St. New York

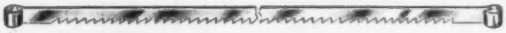
GRIFFIN
COPING SAW BLADES

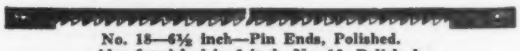
See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL for INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

Sales Department

JOHN H. GRAHAM & CO., INC.
113 Chambers Street
NEW YORK
Pacific Coast Office: 268 Market St., San Francisco


No. 10—6 inch—Loop Ends, Black.


No. 14— 6 inch—Loop Ends, Polished.


No. 18—6½ inch—Pin Ends, Polished.
Also furnished in 6 inch, No. 16, Polished.

Saws with teeth "Set" properly will cut Faster and Easier and will not bind, thus lessening breakage.

"Griffin" Saws are Tempered also.

Your Dealer will supply you—if not, write us.

USE THIS ORDER FORM

JOHN H. GRAHAM & CO., INC.,
113 Chambers St., New York, N. Y.

Send me without charge:
1 No. 10 or No. 14 Loop End Coping Saw Blade } Check ones
1 No. 18 or No. 16 Pin End Coping Saw Blade } desired.

Name (Please Print).....
Address.....
.....
Position.....

It Keeps Your Glue At A Working Temperature

A "Hold-Heet" Electric Glue Pot in your shop is first class insurance against lost time and poor glue work. Just connect it to your electric circuit and the built-in thermostat does the rest. Switch it on and forget about it—no water jacket to fill, no temperature to regulate.

30 Days Free Trial

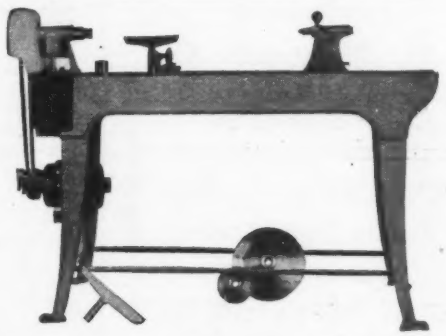
Prove it to yourself. Use the "Hold-Heet" Electric Glue Pot in your own shop. If it doesn't do all we claim for it—send it back. Send no money until you have given it this test.

1 Qt.	$14.00
2 Qt.	17.00
4 Qt.	20.00
8 Qt.	28.00

SPECIFY VOLTAGE— 110 V OR 220 V

Approved by the Underwriters' Laboratories, Inc.

RUSSELL ELECTRIC CO.
364 West Huron St., Chicago, Ill.



Turn to Aero Lathes

for Safety — Power — Speed

4 Reasons Why!

1. Aero B Lathe is recommended for sturdiness—built in 5 or 7 foot bed.
2. Tailstock spindle has novel quick-locking knob.
3. Headstock equipped with S.K.F. ball bearings.
4. All levers attached—Allen Bradley push button starter.

Also manufacturers of O-Gee, Wonder and Driver Sanders.

Send for interesting illustrated 8-page specifications

E. C. Tecktonius Mfg. Co., Racine, Wis.

JOHN S. BENEDICT LUMBER CO.
419 No. Halsted St. CHICAGO
MANUAL TRAINING
L - U - M - B - E - R
We carry everything in our block of sheds, and can furnish anything you want. No order is too large or too small for us to fill.

T. A. Foley Lumber Co.
We Furnish Schools With
Lumber, Panels, Dowels and Cedar Chests
PARIS, ILLINOIS

OZRO M. WILSEY
CHOICE PENNSYLVANIA HARDWOODS
Mfg.
"INDIANHEAD" ARCHERY EQUIPMENT
FRANKLIN, PA. LIMA, O.
Ask for our new Archery Catalogue listing native and foreign woods and supplies.
May we suggest you give archery a trial in your classroom?
Let us bid on your lumber requirements.

Lemonwood Bow Staves
Figured Foreign Hardwoods
J. H. Monteath Co.
206 Lewis St.
New York City.

VENEERED PANELS
For the School Trade
Ask for Price List
WESTERN VENEER & PANEL CO.
1736 Troost Ave., Kansas City, Mo.

Your Lumber Wants and Sources of Supply

Practically every woodworking project brings with it questions of the kind of lumber to use, where to obtain it, suitability of the different kinds of woods, wood finishing problems, etc.

The varieties of lumber now being used in the manual training departments in schools include almost every kind of wood as shown by the following list:

Ash	Pecan
Basswood	Persimmon
Bay	Pine (southern)
Beech	Pine (white)
Birch	Plain red gum
Box Elder	Plain red oak
Buckeye	Plain sap gum
Butternut	Plain white oak
Cedar	Plywoods
Cherry	Poplar
Chestnut	Quar. red gum
Cottonwood	Quar. red oak
Cypress	Quar. sap gum
Elm	Quar. white oak
Hackberry	Redwood
Hemlock	Sassafras
Hickory	Spruce
Laurel	Sycamore
Locust	Tamarack
Magnolia	Tropical woods
Mahogany	Tupelo (black gum)
Maple	Walnut
Norway Pine	Willow

Our readers are invited to write us on all questions relating to lumber, its uses, sources of supply, methods of finishing, etc. Answers are included in each issue under the department "Now, Are There Any Questions?"

The Lumber Dealers whose advertiing appears in the INDUSTRIAL-ARTS MAGAZINE are giving special attention to the school requirements and will give prompt and careful attention to your request for information on the kinds of lumber they carry, its uses, or quote you on your requirements.

WALNUT
THE O'BRIEN LUMBER CO.
2655 S. ROBEY ST., CHICAGO
Operating our own kilns assures you of dryness. Deal with a house known a half century for Quality and Service.
DOMESTIC HARDWOODS
MAHOGANY

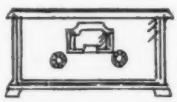
KnoWooD Sample Kit
Contains 24 species of commercially used woods. Each piece labeled. For use in manual training and general science classes.
$1.25 Postpaid
Manual Training Lumber — cut and machined to your specifications. Quick shipments.
John Schroeder Lumber Co.
Foot of Walnut Street
MILWAUKEE, WISCONSIN
Manufacturers of PLAYSKOOL
The child's desk that entertains as it educates.

PLYWOOD and INLAYS
Complete assortment for your student projects. Manual Arts instructors are invited to write for catalogue.
GEO. L. WAETJEN & CO.
713-723 PARK ST., MILWAUKEE, WIS.

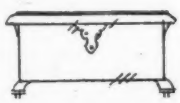
A.V.A. CONVENTION
Visit our Booth No. 14 at Philadelphia
Benjamin Franklin Hotel
FRANK PAXTON LBR. CO.
Kansas City, Kansas

Fancy Leathers
For Craft Workers
A 3-cent stamp brings you samples.
Sold by the half or whole skin and cut to measure.
Send $1.00 P. O. order for variety of colors of leather remnants for home and school work.
Tools and Designs
Snap Fasteners to Match Leathers
Sphinx Paste
W. A. HALL, 250 Devonshire St., Boston 9, Mass.

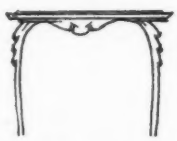
Algoma Plywood Hardwood Panels come in any wood you desire, *always* carefully, beautifully matched. Walnut, Oak and Mahogany are usual finishes. See price list for kind and size panels you want.



Years after the Radio Cabinets are made, the joints remain tight and sound; the veneer has not blistered; the appearance still pleases.



For Cedar Chests, we supply genuine red cedar panels with fronts of figured walnut, or mahogany; or whatever you'd like.



Here is a chance to try the skill of your craftsmen; ask them to make a table top with quartered segments.

Tear off this coupon, fill it in and we will send our price list and our $1.00 book of working drawings for wood workers, entitled "Plywood Projects."

(Check the ones you want)

☐ Send Algoma Plywood price list.

☐ Send Algoma book of working drawings. $1.00. [Plywood Projects.]

Your name.....

.....

Your address.....

.....

Give Algoma Plywood to Your Woodworkers

You can supply your wood working students with beautiful Algoma Plywood, at a price you ordinarily pay for scrap and waste solid woods.

Algoma Plywood is ideal for woodworkers. Each piece is skillfully matched in color and in flaky grain. The superb sanded surfaces can be beautifully finished. The wood is *dry* and can be cut and worked in a precise manner; it does not warp. The plys will not separate; they will stick tight. The joints will not open up, nor show a grievous split-line after the furniture is made, even though a water stain is used.

Algoma Plywood surfaces are so carefully selected and matched that they inspire woodworkers and students to painstaking efforts.

Algoma Panels Are Finer . . . You Can Get Them Quickly

Send for a bundle of Algoma Plywood panels. Keep your store room supplied with beautiful woods. The price is low enough to provide your woodworkers generously. The woods are so beautiful, that finer work invariably results. *Send today for a price list.* Algoma Panel Company, *Algoma, Wisconsin.* Branch and Warehouse, 1234 North Halsted Street, Chicago, Illinois.

Algoma

The Better PLYWOOD

CLASSIFIED WANTS DEPARTMENT

The rate for classified advertisements is $.07 per word per insertion, payable in advance. All wants subject to approval. Minimum 25 words. Forms close on 5th of the month preceding date of issue. Write for discount on yearly insertions.

ASH SQUARES

Manual Training Schools — Ash Squares for Ball Bats. 25 cents and up. The same kind that we use in the manufacture of our bats. Eastman Packing Case Company, Livingston Manor, N. Y.

BACK NUMBERS

Wanted—Will pay 25 cents for December, 1915, October, 1924, and December, 1926, numbers of the INDUSTRIAL-ARTS MAGAZINE. Address issues to Subscription Department, Industrial-Arts Magazine, Milwaukee, Wisconsin.

Will pay 25 cents each for copies of the February, March, and April, 1914, January, May, and July, 1916, and April, 1925, issues of the Industrial-Arts Magazine. Copies must be in fairly good condition. Address reply to Subscription Department, Industrial-Arts Magazine.

BASKETRY MATERIALS

Everything for Elementary Handwork — Also for basketry, weaving, bookbinding, and chair caning. Mounting boards, Waldcraft dyes, crayons, burlap, scissors, punch and eye sets. Thomas Charles Co., 2249 Calumet Ave., Chicago.

Basketry Materials — Reed, Raffia, Bases, Pine Needles, Ash Splints, etc. Free Basketry Catalogues. J. L. Hammett Company, Cambridge, Mass.

Reeds, Raffia, Wooden Bases, Chaircane, Cane Webbing, Indian Ash Splints, Rush, Hong Kong Grass, Willow, Pine Needles, Wooden Beads, Butterflies, Transfers, Grasses, Milkweed, Books, Tools, Dyes and EVERYTHING FOR BASKET MAKING. Send 15c for Catalog and directions. Louis Stoughton Drake, Inc., 33 Everett Street, Allston Station, Boston, Mass.

BASKETRY FORMS

Bases and forms for baskets, trays, lamps and all novelties. Special shapes and sizes at lowest prices. Liberal discount to dealers and institutions. Illustrated catalogue free. Clara M. Hurtig, 188 Lott St., Brooklyn, N. Y.

BATIK

Manual Arts Supplies—Circular and straight knitters. Bookbinding Material, Bead Looms, Stenciling, Stick Printing and Batik Supplies, Wooden Napkin Rings, Plasticine, Flower Pot Moulds. Free Manual Arts Catalogues. J. L. Hammett Company, Cambridge, Mass.

BOOKS

"Practical COLOR Simplified"—A handbook on lacquering, enameling, coloring, and painting by Wm. J. Miskella, M.E., Deals with the choosing, harmonizing, matching, mixing, of color, etc. 128 Pages. 7 Color Plates. 20 Figures. 6¼ x 9¼". Fabrikoid. Price $3.50. 7 day approval, if desired. Finishing Research Laboratories, Inc., 1165 West 22nd St., Chicago, Ill.

BRUSH MAKING

Brush Materials—Brush Fibres, Tampico, Fibre Mixtures, Sterilized Horse Hair, Hair, Bristle and Tampico mixtures solid or taper stock, original lengths or cut to size. Samples matched. E. B. & A. C. Whiting Co., Burlington, Vermont.

Industrial Arts Instructors—Send for our catalog listing Brushes, Furniture Frames, Cocoa Fiber Door Mats, Fiber Brooms, and Twisted Wire Mops, and Dusters. Magnus Brush Materials, 604 W. Lake Street, Dept. M, Chicago.

CASTINGS

Castings, parts and instruction sheets for bench lathes, circular saws, bench drills, jig saws, and grinders. For details write to Chandler Products, 544 N. Taylor Ave., Oak Park, Ill.

CLOCKS

Clock Movements—chimes, dials, part of cases in the knock down, blue prints, designs, instructions, in fact, all assistance required by manual training teachers. Write for free booklet today. American Clock Company, Nicetown, Philadelphia, Pa.

CRAFT MATERIALS

Make Your Gifts and Save Money. Catalog and Directions 15 Cents. Books, Tools, Materials for work in leather, stencilling, wood block printing, china painting, painted wood, weaving, carving, batik, parchment shades, etc. The Colonial School and Crafts Supply Company, 609 California St., Newtonville, Mass.

DRAFTING

Catalog G.—New illustrated catalog on Drawing Stands and Drafting Tables. Suitable for Schools, Drawing Classes, Artists, Draftsmen, and Engineers. The Washburn Shops of the Worcester Polytechnic Institute, Worcester, Mass.

FIBRE CORD

Art Fibre—See our full page advertisement regarding our complete Art-Fibre Weaving Service, Art-Fibre Cord, Stakes, Furniture Frames, Finishes, etc. Write for descriptive Folder. Grand Rapids Fibre Cord Company, Grand Rapids, Michigan.

LEATHER

Wildercraft Lesson Sheets make leather work easy for teacher and student. Write for a free copy. All kinds of Leather for craft work. Goat and calf skin laces. Send 5c stamp for sample cards. Wilder & Company, 1038 Crosby St., Chicago.

Leather Craftwork—Leather for Craft Classes and Club Work. Special Edge Lacings and Thongs for Plaited Work. Projects cut ready to assemble, also whole or half skins. Instruction Charts, Designs, Tools. Special punch with hole spacing gauge. Send 50c for Revised and Enlarged 1928 Edition Handbook of Craftwork in Leather. Includes price list and color samples. Lester Griswold, 623 Park Terrace, Colorado Springs, Colorado.

LOOMS

Looms — Adapted for schools, hospitals, and college use. Eureka rug filling, carpet warp, basket reeds. Send for catalog with price. The Reed Mfg. Co., Springfield, Ohio.

Lane Looms for Hand Weaving—Four harness, built in two sizes, 27 and 45 inches. Also 45 inch size in 4, 6 or 8 harness, for Hospitals, Vocational Schools, or home use. Circular sent on request. Nuttelman Mfg. Co., Florence, Mass.

MACHINE SHOP PROJECTS

The Carlson School Projects are School tested. Write for list. School Projects Co., 2229 Tuohy Ave., Chicago, Ill.

MODELING CLAYS

Modeling Materials — Plasticine, never hardens. Antiseptic, Ten Colors. Send for free sample. J. L. Hammett Company, Cambridge, Mass.

MODEL STEAM ENGINES

Model steam engines and boilers for model power boats. Compressed air plants with radial engines for model aeroplanes. Catalog 10c stamp. Model Machine Shop, 212 Price St., Rahway, N. J.

PRINTING EQUIPMENT AND SUPPLIES

Printing Machinery, Furniture, Materials, or Complete Outfits. We sell the best and popular New Machinery, furniture, material and complete outfits. Also inexpensive Rebuilt Machinery and Equipment. Please give information about your school printing plant or your requirements. Call on us when in Chicago or write for information and estimates. Wanner Machinery Company, 714-16 S. Dearborn St., Chicago, Ill.

PHONOGRAPH SUPPLIES

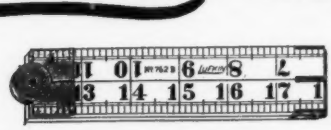
High grade, latest type phonograph parts for manual training projects, also AC radio chassis, speakers, and other apparatus. Catalog free. Federal Supply Co., Kokomo, Ind.

WEAVING

Weaving Supplies—Looms, Roving, Jute, Warp, Macreme, Belfast Cord, etc. Free Weaving Catalogues. J. L. Hammett Company, Cambridge, Mass.

Vises for Sale: Littleton, Colorado, High School has four Herriman No. 7 and three Opportunity Vises in good condition for sale. If interested write H. E. Stafford, Head Manual Department, Littleton High School.

LUFKIN RULES and TOOLS



Accurate
Durable

We offer complete line of wood and steel rules, folding and straight; a pattern for every purpose, each the best designed for its work.

On Sale Everywhere

THE LUFKIN RULE CO.

New York SAGINAW, MICH. Windsor

Send for Catalog

R-W Rapid Acting Vise

—a quarter turn and it slides

Here is a patented vise that is a real time-saver. And it's so simple! The moving jaw slides back and forth full length of the guide rod, without turning. Readjustment to accommodate articles of any size is made in a jiffy. A simple quarter turn of the handle re-engages the nut and gives a continuous screw.

The patented, two-piece, cam-operated nut permits instantaneous adjustment at any point. Nut is released or engaged by a quarter-turn of the handle.

Send for the R-W Catalog

Richards-Wilcox Mfg. Co.

A Hanger for any Door that Slides

New York · · · AURORA, ILLINOIS, U.S.A. · · · Chicago

Boston Philadelphia Cleveland Cincinnati Indianapolis St. Louis New Orleans Des Moines Minneapolis Kansas City Los Angeles San Francisco Omaha Seattle Detroit

Montreal · RICHARDS-WILCOX CANADIAN CO., LTD., LONDON, ONT. · Winnipeg

LARGEST AND MOST COMPLETE LINE OF DOOR HARDWARE MADE

DEVOE

Poster & Show Card Colors

Brilliance and intensity of color are especially important today in the teaching of poster design. Nothing can make this work more interesting to your classes than the colors which make possible the striking effects of our leading modern poster artists —Devoe Poster and Show Card Colors.

DEVOE & RAYNOLDS COMPANY, INC.
1 West 47th St. New York

HIGGINS

A COMPLETE LINE OF BLACKS AND COLORS, FOR EVERY REQUIREMENT OF MECHANICAL AND FREEHAND DRAWING.

BLACKS

GENERAL—(Soluble) for fine line work and washes.
WATERPROOF — for working drawings and all others which must withstand rough handling.

COLORS—*Brilliant and Waterproof*

Far superior to water colors because of their exquisite beauty and brilliancy.

CARMINE GREEN INDIGO VIOLET
BRICK RED BLUE BROWN YELLOW
ORANGE VERMILION SCARLET

WHITE — Waterproof—Opaque
—For correcting blueprints, for rendering the colored inks lighter and opaque.

HIGGINS' DRAWING BOARD AND LIBRARY PASTE
Especially prepared for pasting drawing paper tight and flat to the drawing board. Spreads easily. Never lumps.

A request on your letterhead will bring you a copy of "Techniques," a profusely illustrated 20-page book giving new and interesting uses for Higgins' American Drawing Inks.

Chas. M. Higgins & Co., 271 Ninth St., Brooklyn, N. Y.

Drawing Inks

When you are marking pupils' papers,—that's when you know how good a *thin* colored lead pencil can be,—if you're working with

Dixon's Thinex

Sample offer to Teachers:
Write for out-of-the-ordinary descriptive folder

School Bureau—Pencil Sales Department
Joseph Dixon Crucible Company
Jersey City, N. J.

WRAPPING THE CHRISTMAS PACKAGE

EVEN the cleverest gift is not complete without an artistic wrapping. Let your Christmas art project be the making of tags, seals, and decorative wrappings. Paper bands of drawing paper pasted end to end and decorated with CRAYOLA, replace the commonplace red ribbons. Tags, seals, and enclosure cards may be made with CRAYOLA Wax Crayons, PERMA Pressed Crayons, or ARTISTA Water Colors. Holly, trees, houses, candles, bells, and stars enliven the most ordinary background.

Complete your Christmas work in all the grades with the same artistic finish with which you began it. GOLD MEDAL Products—attractive, appealing, and convenient—will always help you to accomplish your aims.

BINNEY & SMITH CO.
41 E. 42nd St.—New York, N. Y.

Complete Their Holiday Happiness

Mysterious tinseled packages . . . gaily decorated trees . . . all the pleasure and excitement that go with the Christmas celebration . . . surely it's a happy time for children. But we sometimes forget that giving is half the fun, even for the kiddies . . . that their holiday happiness cannot be complete without it.

Think of the gratification the children will derive from making and giving holiday posters, little greeting cards or Christmas novelties. Imagine the pleasure the recipients will get from knowing that the remembrance is the child's own handiwork. It will mean

A MERRY CHRISTMAS TO ALL

The Bradley line of Art Materials includes everything needed for the holiday creative work. A few of the items are mentioned in the following list:

PURATONE PAPERS

Striking silhouettes and artistic posters can be made from these papers. A dull velvet finish prevents light reflection. There are 20 colors to choose from. Packages of 50 sheets can be secured in one color or assorted . . . sizes 6 x 9 and 9 x 12. A sample book awaits your request.

BRADLEY WATER COLORS

Used and appreciated wherever the best in art is sought. They are made for educational work and have become a permanent part of the art courses adopted by progressive schools.

ADHESIVES

For pasting up the elements that go into the formation of the poster or silhouette, Bradley's Adhezo is ideal. For small pictures and mountings use Bradley's Universal Mounting Paste.

BUTTERFLY PAPERS

The happy choice of name perfectly describes the beautiful color effects. With harmonizing colors on two sides, these papers are ideal for poster and construction work. There are two sizes and twelve color combinations . . . packed assorted or solid colors. Send for the Butterfly Sample Book.

BRADLEY CRAYONS

Made in the Bradley laboratories with the same conscientious care as the famous Bradley Water Colors. Free from grit, uniform in texture, and possessing perfect marking and blending qualities.

OTHER SUPPLIES

Bradley's scissors have a patented handle design which fits the fingers. And then there are erasers, art gum, thumb tacks. Everything needed for art work is described in the Bradley catalogue.

AMERICAN CHILDHOOD MAGAZINE

Here the art teacher will find suggestions for Christmas, for other seasons, for every teaching month. For there is a regular department known as Art For American Children.

MILTON BRADLEY COMPANY

SPRINGFIELD, MASS.

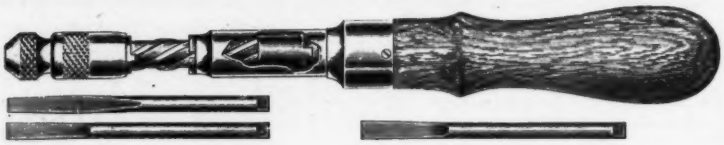
BOSTON NEW YORK PHILADELPHIA SAN FRANCISCO ATLANTA

CHICAGO: Thomas Charles Co., Agts. KANSAS CITY: Hoover Bros., Agts.

CABINET AND CHEST FIXTURES AND TRIMMINGS

MATERIALS, SUPPLIES AND TOOLS
FOR THE WOODWORKER

WE SUPPLY STANDARD PRODUCTS



STRICTLY FIRST QUALITY MATERIALS

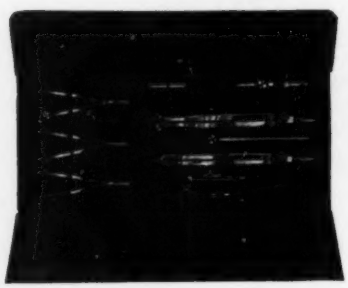
WE ARE SERVING HUNDREDS OF SCHOOLS

OUR CATALOG MAILED GRATIS TO SCHOOL OFFICIALS AND INSTRUCTORS INTERESTED IN MANUAL TRAINING WORK

LUSSKY, WHITE & COOLIDGE, INC.
65 to 71 West Lake Street -:- -:- Chicago, Ill.

POST

DEPENDABLE DRAWING INSTRUMENTS AND MATERIALS



WE SPECIALIZE IN DRAWING MATERIALS FOR SCHOOLS

POST quality represents a standard by which to judge other makes. Made in our own shops, the instruments are of tested highest quality, accuracy, and workmanship.

That is why, today, we count among our staunchest patrons and friends an endless number of Institutions of Teaching and Learning.

With POST instruments the student's efforts are crowned with pleasant results.

COMPLETE REPAIR KITS FURNISHED WITH ALL INSTALLATIONS

Our line comprises everything needed by a School, from Thumb Tacks to Drawing Sets and from Pencils to Drawing Stands.

Write for Catalog

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

THE FREDERICK POST CO.
P. O. Box 803 CHICAGO, ILL.

MAYSVILLE CARPET WARP
For Hand Loomed Rugs

FOR 75 years weavers throughout the entire country have used Maysville Warp. We guarantee this brand to be of excellent quality—Standard Yardage, Uniform Breaking Strength, Proper Dyeing—Tightly wound on ½ lb. tubes and free from knots to a high degree.

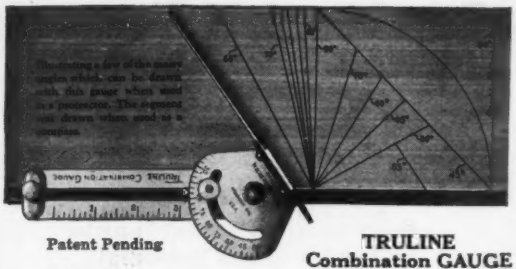
MAYSVILLE RUG FILLER

This material used with Maysville Warp creates an unusually handsome and desirable Rug.

Manufactured by

JANUARY & WOOD COMPANY
Maysville, Ky.

A New Tool of Unusual Merit

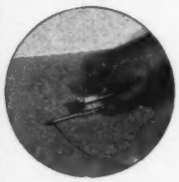


Patent Pending

TRULINE Combination GAUGE

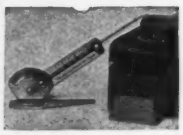
The Truline Gauge is an accurate precision tool of various practical uses. The low price makes it possible to include the Truline Gauge in the tool equipment for each student.

A Most Practical Mitre Gauge. The body and blade are each six inches long. The mitre head has a range of 120 degrees, sixty each side of center, graduated every 5 degrees and numbered every 15, this gives it ample flexibility and simplicity for laying out mitres or angles.



A Marking Gauge and Compass. The marking bar can be extented 5 inches and this bar also functions as a compass and when used as such up to a 20 inch circle can be drawn. The 3 inch scale on the body is convenient for measuring thicknesses of lumber.

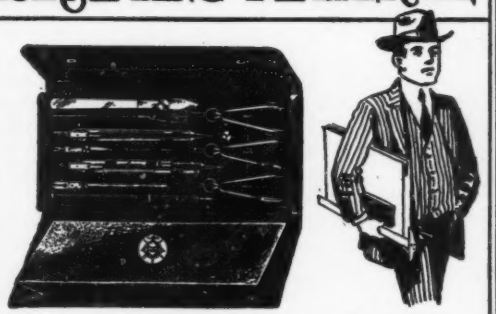
A Surface Gauge. It is as practical within its range as the high priced tools.



Write for illustrated folder, sample offer and special price to schoolboards.

FORSTER, INCORPORATED
790-33RD STREET, MILWAUKEE, WIS.

U.S. BLUE Company's DRAFTING MATERIAL



General agents for the Genuine World Famous Richter Instruments. Beware of imitations. The genuine Richter Instruments have no equal.

Write for our Prices and Catalog

U. S. BLUE CO.
201-207 So. Wabash Ave., CHICAGO, ILL.

for Schools and Colleges

A textbook for beginners—

SIMPLIFIED MECHANICAL DRAWING

by THURMAN C. CROOK

Instructor in Mechanical Drawing, South Bend Central Junior High School and South Bend Vocational School

155 pages, 9 x 6½, illustrated
$1.25

THIS new book presents a drawing course which gives, in clear and comprehensive language, full details and information concerning the reading, writing, and understanding of the graphic language—mechanical drawing. The material for this book has been carefully selected, thoroughly tried in the classroom, and revised until placed on a level with the ability of junior high and vocational school students.

McGraw-Hill Industrial Arts Series

The chief aim of the course is to teach visualization; to strengthen constructive imagination; to form habits of accuracy; to teach the student to make good pencil drawings; and to teach him to read working drawings with facility and rapidity. Much space is devoted to straight-line drawing before attempting compass work.

Lesson Sheets

Each drawing in this text is faced by a lesson sheet. The Lesson Sheet consists of Information, Methods of Procedure, and a List of Questions. With the aid of the Lesson Sheet, lecture work on the part of an instructor is reduced to a minimum; students receive more individual attention; much time is saved; and teaching as well as learning is made easier and more effective.

Problems

The problems are arranged in progressive sequence. They range from the simplest form in wood to very complicated, but practical, projects used in the cabinet and machine shops. Each problem indicates a step of progress over the previous one, yet involves all information and conventions acquired in the development of the preceding problems.

Questions

These are typical:
How many views are necessary for a working drawing?
What is meant by membering?
From what sides of a drawing should dimensions be read?
For what is a center line used?
How do you distinguish a mortise from a tenon?
What is a gained joint? A dodo? A groove?
What is a spline?
What are isometric axes?

May we send you an on-approval copy?

On-Approval Coupon

McGRAW-HILL BOOK COMPANY, INC.,
370 Seventh Avenue, New York.

You may send me on approval Crook's Simplified Mechanical Drawing, $1.25 net, postpaid.

I agree to return the book postpaid if it is not adopted in my classes, or to remit for it.

Signed .....

Address .....

School .....

Official Position.....Ind.-A. 12-1-28

Ideal School Installations that would be a Credit to Industry

They are Practical Because They Take Care of the Maximum Number of Boys in a Limited Space

Installations in the
Allentown, Pennsylvania Junior High Schools

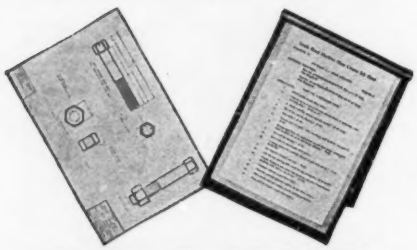
Above—Students operating South Bend Lathes at Central Junior High School, Allentown, Pa.

At right—A battery of South Bend Lathes in First Ward Junior High School, Allentown, Pa.

The Lathes in use are 9-inch South Bend Lathes each with its own reversing motor and reversing switch. Each machine is independent of all others, and may be driven as a single unit.

Machine Shop Course

for Vocational Schools



52 Practical Projects

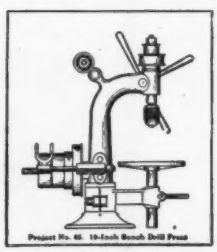
Each One Complete with Blue Prints Job Sheets, Castings and Accessories.

The South Bend Machine Shop Course consists of blue prints and job sheets for 52 practical projects ranging from the small nail set to a 3½ H. P. Marine Gasoline Engine. This Machine Shop Course is developed along the methods used in modern machine shop practice in industry.

Bulletin No. 55 lists, illustrates and prices the 52 projects. It explains the drawings and job sheets and shows their application in the schools. A copy free on request.

Project No. 1 Nail Set

Project No. 21 Bell Centering Punch



Project No. 65 10 Inch Bench Drill Press

Auto Mechanics Service Book No. 66

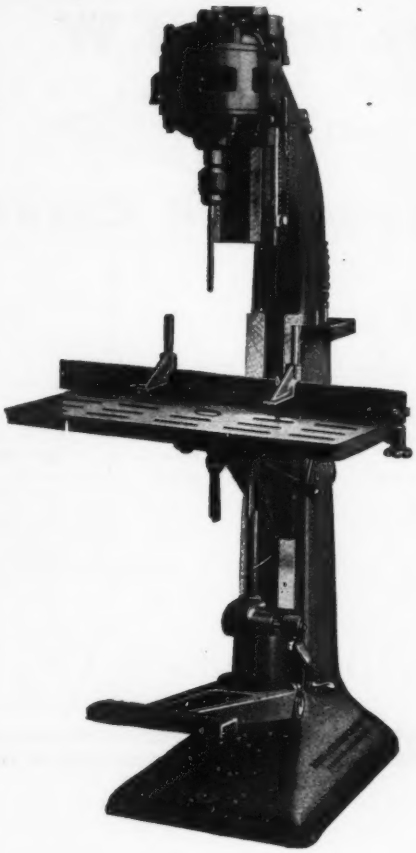
Free to Auto Mechanics Instructors

An unusually complete and helpful Text Book on the most modern methods of machining all parts of the automobile motor in the Auto Service Station, Garage, and Electrical Shop. Contains more than 120 halftones and drawings, illustrating and describing the practical methods of finishing pistons, truing commutators, refacing valves, making bushings, machining fly wheels, testing crankshafts, truing brake drums, grinding reamers, cutting screw threads and doing hundreds of other jobs.

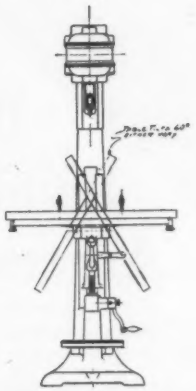
Check Items in Which Interested

- ☐ No. 55 Booklet—Machine Shop Course —Free to Instructors
- ☐ Auto Mechanics Service Book No. 66 —Free to Instructors
- ☐ New General Catalog No. 89—Free
- ☐ "How to Run a Lathe"—Free to Instructors
- ☐ For Junior High School—9 in. and 11 in. lathes, either Bench or Floor Leg Type.
- ☐ For Senior High School—13 in. and 15 in. lathes
- ☐ For Trade School—13 in. and 15 in. lathes
- ☐ For General Shop—11 in. and 13 in. lathes
- ☐ For Night School Shop—13 in., 15 in. and 16 in. lathes
- ☐ For College Engineering Shop—13 in., 15 in. and 16 in. lathes

SOUTH BEND LATHE WORKS 662 E. MADISON ST. SOUTH BEND, IND., U. S. A.



Lasting Boring Machine Satisfaction!

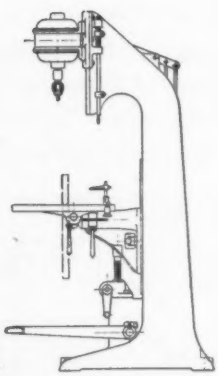


The table on the U-21 is quickly and easily adjusted up to 60 degrees either to the right or left as illustrated here.

EVERY school woodworking shop needs the type of lasting, satisfactory performance rendered by the U-21 Vertical Single Spindle Boring Machine. It makes possible better workmanship with greater ease of operation.

In a moment the treadle can be adjusted to a height for most convenient operation. A hand crank operating an Acme threaded screw obviates the necessity for lifting the table for vertical adjustment. Also the table is universally adjustable and end or edge boring can be done with ease.

Write for the bulletin giving all the reasons for U-21's popularity in woodworking shops everywhere.



This illustration shows the table tilted forward 90 degrees for end boring. There is also an in and out adjustment of the table 1½" from bit center.

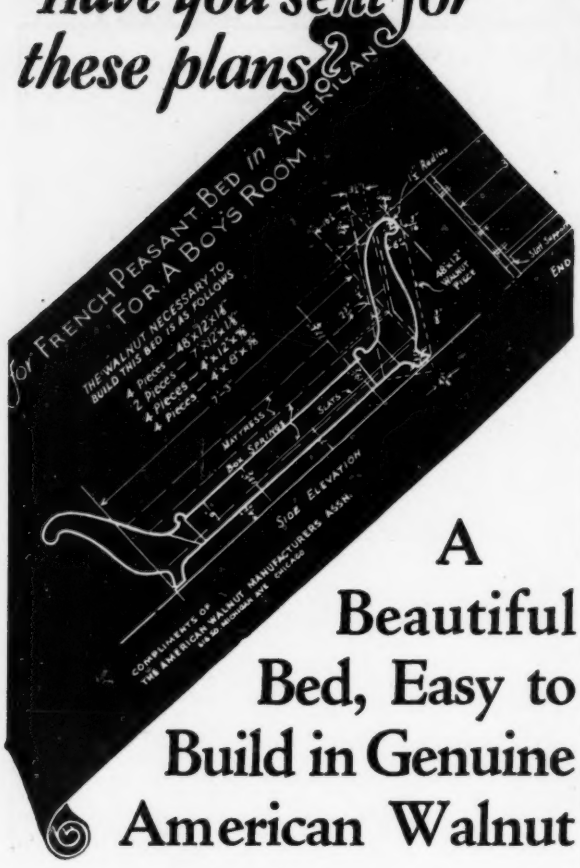
Train Your Students Today on Machines They Will Use Tomorrow

Yates-American Machine Company

Educational Department

BELOIT, WISCONSIN

Have you sent for these plans?


FOR FRENCH PEASANT BED IN AMERICAN
FOR A BOY'S ROOM
THE WALNUT NECESSARY TO BUILD THIS BED IS AS FOLLOWS
SIDE ELEVATION
COMPLIMENTS OF THE AMERICAN WALNUT MANUFACTURERS ASSN.

A Beautiful Bed, Easy to Build in Genuine American Walnut

Since offering blueprints showing construction details of this French Peasant bed designed for a boy's room, requests have come to us from manual training instructors in all parts of the country.

If you have not already sent for a set, we urge you to do so at once. Here is a piece of furniture that any young craftsman will be eager to build, and one that will grace any home.

It is designed to be built of American Walnut—designed to bring out all the beauty of figure, the depth of color, the sturdy grace of Walnut.

The blueprints are available to you, gratis.

American Walnut Manufacturers Association
Room 3409, 616 South Michigan Ave., Chicago, Ill.
Please send me your blueprints of French Peasant Bed, also your brochures on American Walnut.

Name_____

Address_____

AMERICAN WALNUT

Get the NEW

DAKALITE — FADELESS, ARTISTIC, ECONOMICAL, CONVENIENT

Manual and Catalog

Contains, practical, up-to-the-minute information on the use of

Famous Dakalite Water Stains

and all other finishes for

Wood - Fiber - Reed

36 pages, chuck-full of information,

FREE

to Supervisors and Instructors.

Dye-Stain
Oil-Stain
Penetrating-Stain
Weather-Kraft Stain
Fillers
Undercoats
Varnish-Stain
Lacquer
Varnish
Decalcomania
Enamel
Brushes
Spray Guns

Dakalite Products Co., Inc.
13,000 Athens Ave., Cleveland, Ohio.

The INTERNATIONAL—electric GLUE HEATER

A foolproof DRY HEAT TYPE glue heater. No water bath, burnouts or burnt glue. Constructed entirely of heavy spun copper—no seams or soldered joints. Connects to any lamp socket. Deflector type cover prevents evaporation—no skin, scum or dirt. Absolutely NO fire risk. Three heats—rapid melting and uniform temperature. No delicate troublesome thermostats. Uses less current than any other electric glue heater. Made in sizes ranging from 1 pt. to 25 gal. Write for catalog.

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL — INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

LIBERTY ELECTRIC CO.
INDIANAPOLIS

CONFIDENCE

A recent survey shows that during the school year of 1927-1928 a larger percentage of the printing materials sold to schools in the United States was furnished by the American Type Founders Company than by any other firm.

WHY?

The answer is: Because of selling only the highest quality of merchandise, rendering superior service and furnishing professional cooperation. These factors, by inspiring confidence in the minds of the school board, superintendent and supervisor, have enabled the American Type Founders Company to rise above the mere competitive method of selling to schools.

Printing Materials

The materials offered for sale by the American Type Founders Company for school purposes are identically the same in quality as are generally installed in modern commercial printshops.

The American School Type Cabinet No. 9178, the American School Imposing Table (two sizes) and the American School Pressroom Cabinet have been especially designed to facilitate instruction and to accommodate the comparatively small stature of school pupils.

Century Schoolbook type was designed according to specifications laid down by leading scientific authorities. It is the most legible type face ever made and considerable quantities have been sold to schools. Its use relieves the school authorities of a great responsibility in the care of children's eyesight. Hundreds of other type faces designed and produced by the American Type Founders Company offer a wide range of selection.

The American Type Founders Company has Selling Houses in most large cities. This affords the school executive close contact with the Company and prompt delivery of materials.

Service

The Education Department of the American Type Founders Company is equipped to help any school superintendent who expects to install printing in one school or several schools. Whatever the type of school or number of pupils, the efficient service of this Department is available.

In connection with the practical installation of printing for instructional purposes, the Education Department will write the specifications, make a blueprint layout showing the location of each piece of equipment in the proposed printshop, suggest teachers, in fact, arrange all details. This service is rendered without charge or obligation.

The staff of the Education Department is composed of persons who have had actual experience as teachers and executives in the educational field. Recommendations are therefore made from a professional standpoint.

This Education Department has assisted in the installation of probably ninety-five per cent of the three thousand school printshops in the United States.

Backed by many years of unquestioned business integrity, the American Type Founders Company inspires confidence in its products, selling methods and prices. When considering the installation of a new school printshop or the purchase of additional materials for existing school printshops, write to the

EDUCATION DEPARTMENT

American Type Founders Company

300 Communipaw Avenue, *Jersey City, N. J.*

In Modern Composing Rooms

THE PROOF PRESS is being supplanted by the "TEST PRESS"

With Vandercook Rigid Bed Composing Room Presses you can take press proofs in your composing room. These modern machines give you a "test" proof of the printing qualities of all printing surfaces before the form goes to press, thus saving valuable time on production presses.

You should teach the modern method in your school.

For particulars address

VANDERCOOK & SONS

Originators of the Modern Proof Press

900 North Kilpatrick Ave., CHICAGO

DIETZGEN

DRAWING MATERIALS

THE universal and constantly increasing use of Dietzgen Drawing Instruments and Materials is a natural consequence of forty years satisfactory service.

Standardized production, giving high quality at low cost, permits obtaining replacement parts at all times. This is unique with Dietzgen and adds years of use to your instruments.

Dietzgen products are serviced the country over and are standard everywhere.

EUGENE DIETZGEN CO.

Enduring worth at reasonable cost

Chicago · New York · New Orleans · Pittsburgh · San Francisco · Philadelphia · Washington · Milwaukee · Los Angeles · Factory at Chicago

Manufacturers of Drafting and Surveying Supplies

Printing Instructors

Send to us or any dealer in Printers' Supplies for literature on any of the following machines and utilities, in use throughout the World:

Lee Two-Revolution Cylinder Presses
Diamond Power and Lever Paper Cutters
Advance Lever Paper Cutters
Hoerner Combination Type-High Machine
Sieber Adjustable Hand Punch
Challenge Proof Presses
McGreal Combination Printers' Chases
Challenge Labor-Saving Iron Furniture
Challenge Mammoth Iron Furniture
Challenge Notched Iron Furniture
Challenge Semi-Steel Imposing Surfaces
Challenge Pressed Steel Galleys
Challenge Rigid Rim Galleys
Challenge Iron Sectional Blocks and Hooks
Challenge Type-High Gauges
Challenge Quoins and Keys

Our Magazine "The Printers' Album" sent gratis — Ask for it

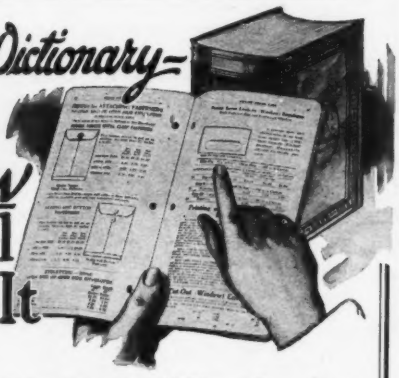
The Challenge Machinery Co.

See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

Grand Haven, Michigan

Chicago, 17-19 E. Austin Ave.
New York, 200 Hudson St.

As in the Dictionary—
You *Know* You'll Find It



New Trade Price List No. 30 More Complete Than Ever

Other Valuable Information That You May Have
New Window Envelope Chart
together with Trade Circular No. 3 which explains the chart and gives complete window envelope information

New Postal Laws Boiled Down and Made Clear
The Above Is Printed on 11 x 14 Card
Convenient to Hang Up for Ready Reference

Write Today Without Any Obligation to

Printers Envelope Service Station
Western States Envelope Co.
MILWAUKEE, WIS.

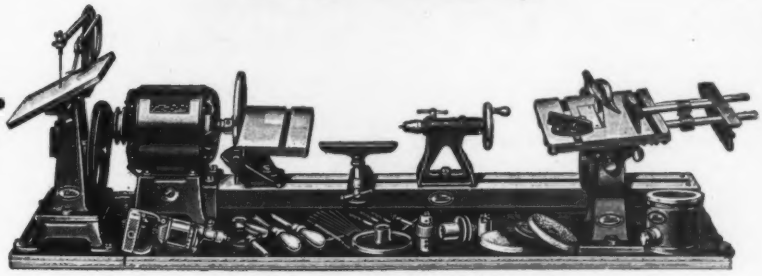
Practical Equipment For Manual Arts Schools

Mac THE POPULAR MECHANIC

SPECIAL PROPOSITION TO SCHOOLS

ELECTRIC WORKSHOP

Guaranteed Satisfactory



EQUIPMENT

Wagner ¼ H. P. Motor, 8½" Sander Disc, Circular Saw, Jig Saw, 30" Lathe with 9" swing, Black & Decker ¼" Drill, Electric Glue Pot. Accessories include 5" Dia. Face Plate, ⅜" Three-jaw geared Chuck, Spur and Cup Type Wood Turning Centers, Arbor and Flange, 6" Cotton Buffs, 6" Wire Brushes, 5" Emery Wheel, Adjustable Tool Rest and Tool Supports with Bed Clamp, Two Turning Tools, and Socket Wrenches.

Ideal For Schools, Carpenters, Pattern Makers, Etc.

Mac, THE POPULAR MECHANIC, is sturdy, dependably built, accurate, a practical outfit fully guaranteed. It provides the student with accurate machinery with which to do jig sawing, spindlework, rip or cross cut sawing, sanding, grinding, polishing, drilling, and many more operations, in a workmanlike manner. It is suitable for making tables, benches, chairs, desks, novelty furniture, for doing repair work, building bird houses, etc. Its price enables the school to have SEVERAL outfits for students' use at the same cost as one of the larger factory outfits. "Mac" does the same class of work as larger outfits.

Special Price To Schools

At regular prices, Mac, THE POPULAR MECHANIC, gives maximum value. Our prices are surprisingly low. We want every Manual Training School to have one or more of these outfits and we therefore will give you a substantial discount from regular prices.

Write for our special school proposition today.

MIDLAND APPLIANCE CORPORATION

DEPT. R-12, 219 N. MICHIGAN AVE., CHICAGO, ILL.

Classroom Drawing Tables Built to Your Specifications

Let us cooperate with you in designing and building drawing tables best suited to your requirements. F. Weber Co., Inc., 1220 Buttonwood St., Philadelphia. Branches: St. Louis, Baltimore.

WEBER

Drawing Instruments & Materials

ANNOUNCING

Principles and Practices of Vocational Guidance

BY

I. DAVID COHEN, A.B., LL.B.

Principal of the Brooklyn Boys' Continuation School, New York, formerly Supervisor of Vocational Advisement and Training of the Federal Board for Vocational Education, Bureau of Rehabilitation; Author of "The Gateway to English: A Plan for Vocational Guidance," etc.

An up-to-date, common-sense presentation of the principles, methods, and devices of vocational guidance. Part I deals with present-day conditions in industry, education, and the home; views various phases of guidance; and from a number of case studies formulates twenty principles to aid the worker in the field. Part II covers the first steps in guidance, visiting industries, making studies and surveys, etc. Part III offers a full and clear account of modern practices, explaining the methods of administering guidance, teaching occupations, organizing guidance bureaus and departments, and training counselors. This is a comprehensive, well-organized, and practical manual, prepared by an authority on the subject.

THE CENTURY CO.

353 Fourth Avenue, New York

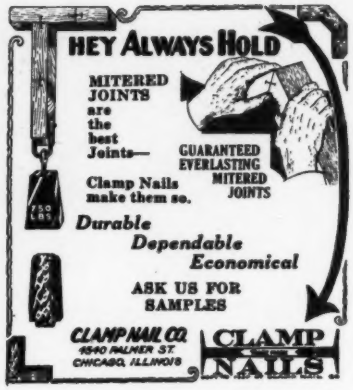
2126 Prairie Avenue, Chicago

WINDOW SHOPPERS GUIDE

DESIGN BOOK FREE

Listing many new projects — chests — lamps — gate leg tables — spinet desks — magazine end tables — racks, and many other furniture oddities your students will be glad to build are illustrated, described and priced **Red-I-Kut** in our 1929 design book. Big help, time and money saver to you and the boys. Write now so as to be sure your copy as well as lumber chart will be mailed as soon as this popular treatise is off the press.

THE KUEMPEL COMPANY
Project Design Dep't Guttenberg, Iowa



Jewelry and Metal Work Equipment and Supplies

Tools of all kinds for Jewelry, Silver and Copper Rose Hammers and Anvils. Send for our catalogue.

Our Brochure "Things in and About Metal" sent free for the asking.

METAL CRAFTS SUPPLY CO.
Providence, R. I.

WHEELS
FOR RACY TOYS FOR BOYS

We will ship you parcel post C.O.D. any combination of the following:

2 only 5" P. B. disc wheels with ⅝" rubber tire—1 only ⅜ axle 12" long—hub caps and cotter pins—weight 2 lbs.....$0.45
2 only 8" R. B. disc wheels with ⅝" rubber tire—1 only ½" axle 15½" long—hub caps and cotter pins—weight 6 lbs...$0.75
2 only 10" R. B. disc wheels with ¾" rubber tire—1 only ½" axle 18" long—hub caps and cotter pins—weight 8 lbs...$0.90

Write your order plainly and mail today.

TOY PARTS SUPPLY CO.
5237 N. Sawyer Ave., Chicago, Ill.

APRONS—
FOR THE MANVAL TRAINING SHOP

Protect clothes; save cleaner's bills; make classroom look business-like! Needed by students; approved by parents; standard equipment in training shops all over the country for years. Adjustable height, 28" x 35", white 60c, brown 65c.

INSTRUCTORS: You get one large Instructor's Apron FREE with order of 12 Student Aprons. ORDER NOW, remit after collection from students, or instruct us to charge to School Treasurer. Our "Money Back" guarantee protects wearer. Prepaid anywhere east of Denver.

Canvas Products Corp., Fond du Lac, Wis.

The Handicrafter

is a bi-monthly magazine devoted solely to the interests of crafts. It treats them from technical, practical, and historical standpoints, always furnishing ideas, designs, and drafts. Some of the crafts included are weaving, embroidery, batik work, block printing, leather, reed and raffia.

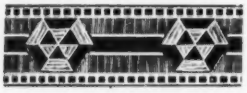
Single Copy 40c Year $2.00

Write now for the December number—you will find it interesting and valuable.

The Handicrafter
(Emile Bernat & Sons Co.)
Jamaica Plains, Mass.

OVERLAYS—BORDER STRIPES

Largest number of designs, largest stock for immediate delivery, and lowest prices of any firm in the world.



MARQUETERIE CORPORATION
1 PARK AVE. NEW YORK CITY
Ask for 1928 Catalog

Complete Nickel Plated NUT BOWL HARDWARE
$1.00 per set postpaid.
Send for full size working drawing.

It's free.
R. K. BAILEY & CO. 8405 W. Detroit Ave. Cleveland, Ohio.

CARVING, LINOLEUM BLOCK, LEATHER TOOLS
For the Industrial Arts
Send for illustrated catalog
CHAS. MAIERS & SONS
Manufacturers - Established 1884
59 - 16th AVE. NEWARK, N. J.

BOWS AND ARROWS

Any wideawake youngster would rather make a bow than a breadboard. ***Let him make something HE can use.***

L. E. STEMMLER CO.
Queens Village, New York

A complete line of raw materials and accessories at popular prices.
Write for FREE Catalog No. 10
BOWS AND ARROWS

ELECTRIC SHOP SUPPLIES

Wiring supplies and fittings, Resistance wire and Mica. Copper, brass, fibre, and Formica rods, sheets, and tubes. Transite and asbestos in suitable sizes. Radio parts and all other material and equipment required in the electric shop. Write for price list.

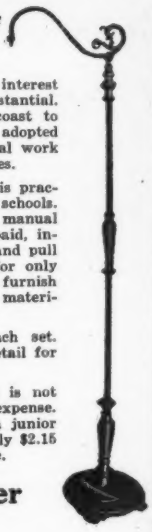
TRI. "K" ELECTRIC MFG. CO.
2825 N. Troy St., Chicago

Shaper Cutters, Molding Cutters, Glue Joint Cutters, Special Cutters, Spindle Carving Cutters, Spindle Carving Machines, Special Machinery, Special Tools, etc.
Anthe Machine Works
Established 1897
Wood Working Cutters
Covington, Kentucky

PHOTOSTATS BLUE PRINTS
THE HUEY CO.
19 So. Wabash Ave.
CHICAGO, ILL.
Manufacturers of Brown and Blue Print Paper for the largest Industrial Plants in the U. S. A.

For Your Manual Training Classes!

All-Metal Floor Lamps, Bridge Lamps and Torcheres



Just what you need to hold the interest of every pupil—practical and substantial. Has been used in schools from coast to coast. Many schools now have adopted lamps as a regular project in metal work and are ordering in large quantities.

Special offer now to introduce this practical fixture to manual training schools. One sample set will be sent to any manual arts instructor for only $2.45 postpaid, including four castings, bridge arm and pull chain socket. This offer is good for only one set to a school. Student may furnish his own pipe, wiring and finishing materials if he wishes.

Directions for erection with each set. Easy to erect a lamp that would retail for $8.00 to $15.00 each.

Order a sample set now. If it is not what you want, return at our expense. Your money will be refunded. If a junior floor lamp set is preferred, send only $2.15 for sample on same terms as above.

Midwest Lumber Company
Appleton, Wis.

Lumber, Lamp and Shop Supplies Exclusively for Schools.
Write for complete illustrated price circular free.

ONLY $2.45 Postpaid

FOOLPROOF!

In the school shop, unskilled hands WILL putter around and experiment.

But Sta-Warm Electric Glue Heaters are foolproof! No possibility of over-heating or under-heating. No water jacket to boil dry. No necessity for watching the temperature. Just snap the switch. Sta-Warm operation is entirely automatic and always keeps glue at the correct temperature.

Write for descriptive folder.

Distributors
OLIVER MACHINERY CO.
Grand Rapids — Mich.

Sta-Warm

ELECTRIC GLUE HEATERS

Beauty - Durability and Moderate Cost

are assured when you use our

Philippine Mahogany for Manual Training

All Philippine Mahogany purchased from us for manual training, carries our guarantee of replacement, without charge, if found to be defective.

We shall be glad to have you visit our exhibit at Booths 11 and 12, at the Convention of the American Vocational Association, Benjamin Franklin Hotel, Philadelphia, Pa., Dec. 13-14-15.

Make Booths 11 and 12 your headquarters, while attending the Convention.

Indiana Quartered Oak Co.

224 East Ave. - - Long Island City, N. Y.

This CLOCK is a Project that *Pays Dividends*

"The Spirit of Time"

TEACH your pupils how to build a CLOCK. They will learn better craftsmanship—be everlastingly proud of what they make—and derive year-after-year *value* from it.

BANJO CLOCK Builds and Holds Lasting Enthusiasm

Our new "Spirit of Time" Banjo Clock has been acclaimed by instructors wherever shown. It fits in with your requirements and equipment, and will win the sustained interest of your pupils. Beautiful design, fascinating to build. Complete set including dependable 8-day movement, silvered dial, eagle and brass scrolls—$6.75. Complete "knock-down" wooden parts for case—$1.75.

Blue Prints? Gladly! We furnish plans, detailed instructions, helpful suggestions. Blue Prints of 16 successful clocks, from small mantel designs to Grandfather's Clock, sent to any manual training instructor without charge. May we send your set, and our catalog?

Vocational Teacher Says:

"You have hit on just the right thing for boys. They are all very enthusiastic about the 'Spirit of Time' Banjo Clock."

E. E. Parlin, Lawrence, Mass.

AMERICAN CHIME CLOCK COMPANY
1677-V Ruffner St. Philadelphia, Pa.

TEACHER AGENCIES

TEACHERS

Make your training count. Get the best position to be had. Let us tell you of choice openings in just the locality desired. Highest salaries. Confidential service. No obligation to accept any place. Cincinnati, Rochester, Indianapolis, Atlanta, Des Moines, Omaha, St. Louis, and other leading cities have selected our candidates. Not an ordinary agency. Leading bureau for specialists. Write for details—NOW.

SPECIALISTS' EDUCATIONAL BUREAU
Shubert-Rialto Bldg., St. Louis, Mo.

SPECIAL TEACHERS With good preparation are in demand. Our clients are City Schools, large and small, Vocational Schools, State Colleges, Technical Schools—everywhere. Write for 43d Annual.

THE ALBERT TEACHERS' AGENCY
25 East Jackson Blvd., Chicago — Peyton Bldg., Spokane, Washington
535 Fifth Avenue, New York City — York Rite Temple, Wichita, Kansas

---

SOUTHERN TEACHERS' AGENCY
COLUMBIA, S. C.
CHATTANOOGA, TENN.
RICHMOND, VA.
LOUISVILLE, KY.

Continuous registration in four offices.
No advance fees.
Covers Middle Atlantic, South and Middle West.

A New Test of Home Mechanics

We announce the publication of the Newkirk-Stoddard Home Mechanics Test

A standardized test over the essential knowledge that pupils in Home Mechanics courses should have. Useful for survey, sectioning of classes, guidance, and diagnostic work. Two forms, A and B, each consisting of 36 important job-units.

Write for Unit Set, consisting of one copy of each form, answer keys, record sheets, examiner's manual, Twenty-five cents postpaid.

PRICES: Four cents per copy in any amount.
Examiner's Manual, Ten cents per copy.

Bureau of Educational Research and Service
University of Iowa, Iowa City

SELF-INSTRUCTION PROJECT PAMPHLETS

Prominent educators recognize the value of the project method of teaching Junior High School Industrial Arts. Our material is prepared by specialists to assist both the teacher and student in this method of instruction.

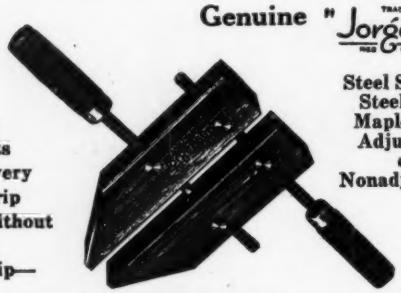
These Project Pamphlets Will Make Your Teaching Easier

How to Make and Fly a Model Aeroplane.
How to Make and Sail a Model Yacht.
How to Make a Cat Boat.
How to Make an Electric Motor.
How to Make a 25-Inch Model Yacht.
How to Make a Costumer.
How to Make a Fire Building Set.
How to Make Decorative Book Ends.
How to Make a Handy Pan.
How to Make Luminous House Numbers.
How to Make Copper Book Ends.
How to Do Simple Wood Finishing.
How to Make a Concrete Flower Box.
How to Make a Smoking Stand.
How to Make an End Table.
How to Make an Electric Toaster.

Single copy (any pamphlet), $.25.
20% discount on orders over $1.00.

PRACTICAL ARTS PUBLISHING CO.
44 VISTA AVENUE — ELIZABETH, NEW JERSEY

Genuine "Jorgensen" TRADE MARK REG U.S. PAT OFF



It fits every grip without a slip—

Steel Spindles
Steel Nuts
Maple Jaws
Adjustable or Nonadjustable

Adjustable Clamp Co.
424 N. ASHLAND AVE.,
CHICAGO, ILL.

LOOK FOR THE NAME

BALSA WOOD
For Building Your Model Airplanes

You may obtain from us the following standard sizes of balsa for model airplane construction:

2 in.	thick, 6 in.	wide, 36 in.	long, @	$1.25 each
2 in.	thick, 5 in.	wide, 40 in.	long, @	1.25 each
3 in.	thick, 6 in.	wide, 36 in.	long, @	1.75 each
3 in.	thick, 5 in.	wide, 40 in.	long, @	1.75 each
⅛ in.	thick, 6 in.	wide, 36 in.	long, @	.60 each

Prices include postage.
Booklet of Plans for model airplane construction furnished on request.

The Fleischmann Transportation Co.
689 Washington St., New York City, N. Y.
327 So. La Salle St., Chicago, Ill.
245 11th St., San Francisco, Cal.

Rapid-Acting Vises $5.15

Additional vise and drawers extra.

Bench without drawers, with our rapid-acting vise, $15.00

Send for catalogue.

COLUMBIA SCHOOL SUPPLY CO.
INDIANAPOLIS, INDIANA

THE BEMIS STANDARD VISE

PATENTED Aug. 6, 1912

PRICES { No. 1, plain $3.50; No. 3, with dog 3.75; No. 5, " " 3.75

Send for descriptive circular

A. L. BEMIS 68 Commercial Street WORCESTER, MASS.

SIMPLEX AIR MODEL CO.

Auburn, Mass.

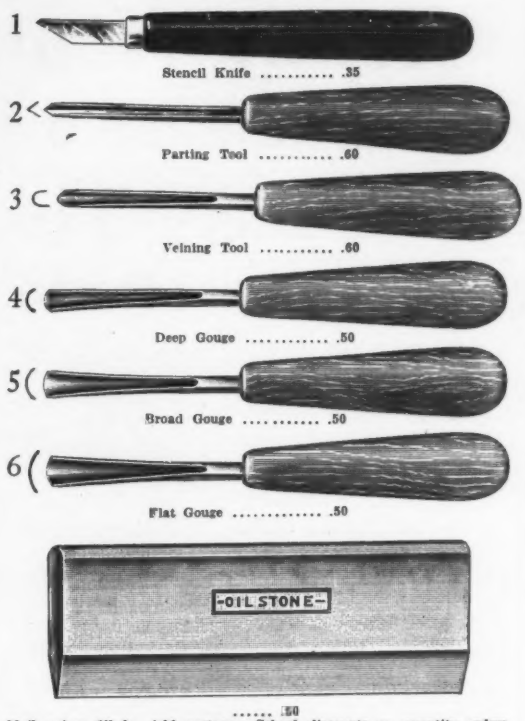
Send 5 cents for complete parts list. A 5 cent service charge is required on all orders amounting to less than $1. A 5 cent packing charge is required on all shipments of wood or metal greater than 18″ in length. Prices are subject to change without notice. All goods sent postpaid in the U. S. A. No stamps or C. O. D. orders accepted.

1/16″ x 1/8″ x 3′	Spruce	.03¢	Balsa	
1/16″ x 1″ x 3′			"	.06¢
1/8″ x 1/8″ x 3′	"	.03	"	.033
1/8″ x 1/4″ x 3′	"	.045	"	.054
1/4″ x 1/4″ x 3′	"	.054	"	.06
1/2″ x 1″ x 3′			"	.24
1″ x 3″ x 3′			"	.48
1″ x 3″ x 3 1/2′			"	.56

Reed, 6′ lengths, 1/16″ diam., .05¢; 1/8″, .075¢; 3/16″, .10¢.
Balsa discs, 1/4″ thick, 2″ diam., .07¢; 3″, .08¢; 4″, .09¢.
Ambroid dope, 1/4 pint, .50¢; 1/2 pint, .95¢.
Ambroid cement, 2 oz., .33¢; 4 oz., .53¢.
Bamboo paper, 13″ x 36″, .12¢; 24 3/4″ x 33 3/4″, .14¢.
Rice paper, 18″ x 24″, .09¢; 21″ x 25″, .06¢.
Wood veneer, 20″ x 30″, .22¢.
Flat rubber, 50′ of 1/8″, .50¢; 50′ of 3/16″, .75¢.
Piano wire, 3′ of No. 5 or No. 8, .04¢; 3′ of No. 11 or No. 15, .06¢.
28-30-32-34 steel wire, per spool, .10¢.
1/16″ copper washers, 10 for .05¢.

We can supply any size balsa that you need, also propellers, I beams, wing sections, bolts, nuts, screws, brads, aluminum, brass tubing, turnbuckles, and books on model building.

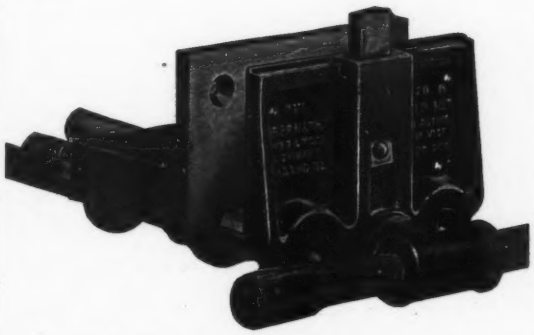
LONDON ADDIS
Linoleum and Woodblock Tools



Mail orders filled. Add postage. School discounts on quantity orders. Distributors

CHAS. F. BINGLER SONS, INC., 182 Sixth Ave., New York City

— ABERNATHY —
ROLLER NUT Rapid Acting VISES



give the most satisfactory service in school shops because of their Simplicity, Strength and Refinement of construction.

Write for copy of our latest circular.

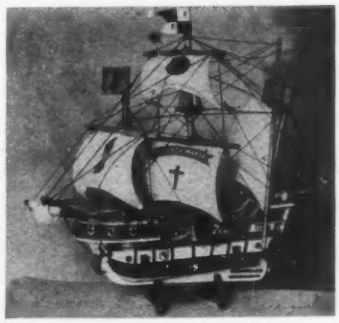
THE ABERNATHY VISE & TOOL COMPANY

2842 West 26th St. CHICAGO, ILLINOIS

A $100.00 Ship Model for $4.98

Santa Maria

25 in. High;
11 in. Wide;
27 in. Long.



We will supply all the parts cut to fit and ready to assemble for the Santa Maria, Mayflower, or LaPinta at $4.98 each. Parts also may be had for the Constitution at $6.98. Full instructions for assembling any of the above models are included with each kit. A diagram of parts showing the number of parts and just how to piece together the model make it impossible for you to go wrong. For very little money and a few hours of pleasant pastime you will have a beautiful ship model that will add a distinctive touch to your home.

Send for our beautiful illustrated free booklet containing photos and full information of all our models.

MINIATURE SHIP MODELS, INC.,
Dept. IA-1, 3818-24 Baring Street,
Philadelphia, Pa.

MINIATURE SHIP MODELS, INC.
3818-24 BARING STREET
PHILADELPHIA, PA.

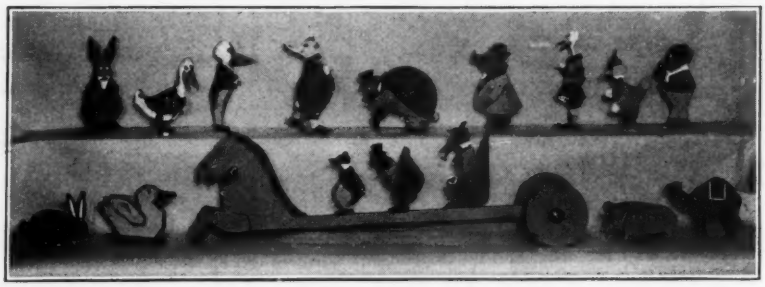
Please send me the complete parts cut to fit and ready to put together for the model.....
I will pay the Postman $.....
plus a few cents postage.....
NAME .....
STREET OR R. F. D.....
CITY..... STATE.....

Ready Now!

These Two New Toy Books

Easy-To-Make Toys

Another Kunou Book



Projects of real educational value that "go across" with enthusiasm. Its major aim is to teach boys and girls how to make useful and artistic objects as a part of their school and home activities.

The designs in the book are varied and novel in their conception. Color schemes suggest the modern advances made in color combinations. The author, Mr. C. A. Kunou, Supervisor of Manual Education in the Los Angeles city schools, has contributed a worthy addition to standard works in this subject.

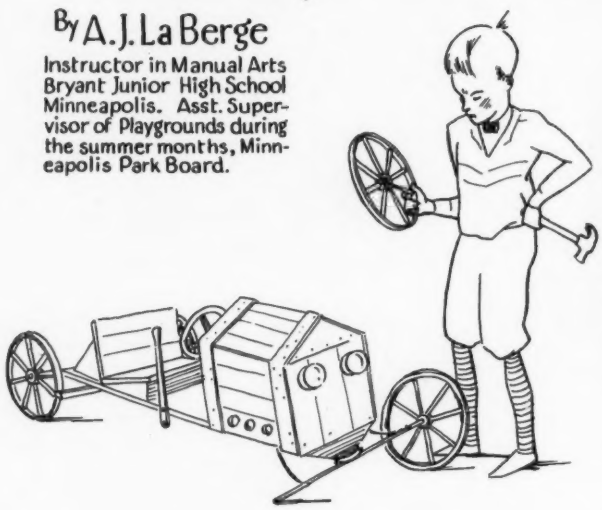
Board cover, 80 pages; 8½ x 11½ inches.

Price $1.44.

Speed Toys For Boys

By A. J. La Berge

Instructor in Manual Arts Bryant Junior High School Minneapolis. Asst. Supervisor of Playgrounds during the summer months, Minneapolis Park Board.



Pep, speed, thrills galore for active healthy, growing youngsters. SPEED TOYS FOR BOYS and Girls, too, suggests to them just that variety of worth while recreational projects which will keep them busy during leisure hours.

Numerous problems consisting of carts and hobby cars, scooters and wagons, pushmobiles, coasters, wheel barrows, bobsleds and toboggans, are presented in the book. It contains every appeal for the wideawake boy that the fascinating toy that "goes" always does. There isn't a boy anywhere who isn't just burning up with a desire to build things. Give him a chance to express himself!

Cloth, 96 pages, 7¼ x 10 inches.

Price $1.25

The Bruce Publishing Company

212 Montgomery Bldg., Milwaukee, Wis.

INDUSTRIAL ARTS
DIRECTORY OF EQUIPMENT AND SUPPLIES

All firms listed in this directory have been thoroughly investigated and their goods are "guaranteed" by us. Instructors who specify these goods for purchase through boards of education have therefore positive assurance of satisfaction.

ANVILS
Atkins & Co., E. C.
Columbian Vise & Mfg. Co., The
Disston & Sons, Henry

AEROPLANE MODELS
Mount Carmel Mfg. Co.
Simplex Air Model Co.

ARTISTS' MATERIALS
Devoe & Raynolds Co.
Dietzgen Company, Eugene
Pease Company, The C. F.
Weber Company, F.

ARBORS
Morse Twist Drill & Machine Co.

BAND SAWS
American Saw Mill Mchy. Co.
Disston & Sons, Henry
Parks Wdwkg. Machine Co., The
Yates-American Machine Co.

BENCH LATHES
Blount Company, J. G.
South Bend Lathe Works
Wallace & Co., J. D.
Yates-American Machine Co.

BITS
Atkins & Company, E. C.
Cincinnati Tool Co.
Irwin Auger Bit Company
Jennings Mfg. Co., Russell
Peck, Stow & Wilcox Co.
Sargent & Company

BLACKSMITHS' TOOLS
Buffalo Forge Company
Cincinnati Tool Company
Stanley Rule & Level Plant, The

BLUE PRINT FILING CASES
Dietzgen Company, Eugene
Kewaunee Mfg. Company
Pease Company, The C. F.
Post Company, Frederick
U. S. Blue Print Paper Co.
Weber Company, F.

BLUE PRINT MACHINERY
Dietzgen Company, Eugene
Pease Company, The C. F.
U. S. Blue Print Paper Co.
Weber Company, F.
Wickes Brothers

BLUE PRINT PAPER
Dietzgen Company, Eugene
Pease Company, The C. F.
Post Company, Frederick
U. S. Blue Print Paper Co.
Weber Company, F.

BOOKS
Bruce Publishing Company
Century Company, The
Industrial Educ. Book Co.
International Textbook Co.
McGraw-Hill Book Co., Inc.
Pitman & Sons, Isaac
Practical Arts Pub. Co.
Ronald Press, The
Van Nostrand Company, D.

BRACES
Atkins & Company, E. C.
Irwin Auger Bit Company
Jennings Mfg. Co., Russell
North Bros. Mfg. Company
Peck, Stow & Wilcox Co.
Sargent & Company
Stanley Rule & Level Plant, The

CALIPERS
Starrett Company, L. S.

CARPET WARP SUPPLIES
January & Wood Co., Inc.

CARVING TOOLS
Bingler Sons, Inc., Chas. F.

CASTINGS—MACHINE
Chandler Products

CHISELS
Cincinnati Tool Company
Disston & Sons, Henry
Peck, Stow & Wilcox Co.
Sargent & Company
Stanley Rule & Level Plant, The

CLAMPS
Adjustable Clamp Company
Atkins & Company, E. C.
Cincinnati Tool Company
Christiansen, C.
Crescent Machine Co., The
Disston & Sons, Henry
Gross Hdwe. & Supply Co., Ph.
Hartford Clamp Company
Sargent & Company
Starrett & Company, L. S.

CLOCK PARTS
American Chime Clock Co.

CLUTCHES—FRICTION
Johnson Machine Co., Carlyle

COMB. WOODWORKERS
Delta Mfg. Company
Midland Appliance Corp.
Parks Wdwkg. Machine Co., The

COPING SAWS AND BLADES
Graham & Co., Inc., John H.

CORDAGE
January & Wood Co., Inc.

COUNTERBORES
Cleveland Twist Drill Co.

COUNTERSINKS
Cincinnati Tool Company
Cleveland Twist Drill Co.
Sargent & Company
Stanley Rule & Level Plant, The

CRAYONS
American Crayon Company
Binney & Smith Company
Bradley Company, Milton
Dixon Crucible Co., Jos.

CUTTERS
Morse Twist Drill & Machine Co.

DOMESTIC SCIENCE EQUIP. AND SUPPLIES
Bemis, A. L.
Kewaunee Mfg. Company
Sheldon & Company, E. H.

DOOR HINGES—INVISIBLE
Soss Manufacturing Co.

DRAFTING ROOM FURNITURE AND SUPPLIES
Bradley Company, Milton
Christiansen, C.
Devoe & Raynolds Company
Dietzgen Company, Eugene
Kewaunee Mfg. Company
Pease Company, The C. F.
Post Company, Frederick
U. S. Blue Print Paper Co.
Weber Company, F.

DRAFTING INSTRUMENTS AND PAPER
Dietzgen Company, Eugene
Pease Company, The C. F.
Post Company, Frederick
U. S. Blue Print Paper Co.
Weber Company, F.

DRILLS, PORTABLE ELECTRIC
Clark, Jr., Electric Co., Jas.

DRILL PRESSES
Buffalo Forge Company
Clark, Jr., Electric Co., Jas.
Millers Falls Company
North Bros. Mfg. Company

END MILLS
Cleveland Twist Drill Company

ENVELOPES
Western States Envelope Co.

EXHAUST FANS
Buffalo Forge Company
Oliver Machinery Company

FIBRE CORD
Grand Rapids Fibre Cord Co.

FILES
Disston & Sons, Henry

FILLERS
Dakalite Products Co., Inc.
Johnson & Son, S. C.

FLASKS
Oliver Machinery Company

FORGES
Buffalo Forge Company
Oliver Machinery Co.

FURNACES—SOLDERING
Johnson Gas Appliance Co.

FURNITURE FRAMES
Grand Rapids Fibre Cord Co.

GAUGES
Atkins & Company, E. C.
Disston & Sons, Henry
Morse Twist Drill & Machine Co.
Forster, Incorporated
Stanley Rule & Level Plant, The
Sargent & Company
Starrett Company, L. S.

GLUE
Higgins & Company, Chas. M.

GLUE HEATERS
Beckwith Machine Company
Hall & Brown Wdwkg. Mach. Co.
Liberty Electric Company
Oliver Machinery Co.
Russell Electric Company
Wallace & Company, J. D.
Yates-American Machine Co.

GRINDERS
Blount Company, J. G.
Clark, Jr., Electric Co., Jas.
Cleveland Stone Company
Crescent Machine Co., The
Efficiency Grinder Co.
Gallmeyer & Livingston Co.
Luther Grinder Mfg. Co.
Mummert-Dixon Company
Oliver Machinery Company
Porter Cable Machine Co.
Wallace & Company, J. D.
Yates-American Machine Co.

HACKSAWS
Atkins & Company, E. C.
Clark, Jr., Electric Co., Jas.
Disston & Sons, Henry
Graham & Co., Inc., John H.
Millers Falls Company
Simonds Saw & Steel Co.
Starrett Company, L. S.

HAMMERS
Atkins & Company, E. C.
Maydole Hammer Co., David
Peck, Stow & Wilcox Co.
Stanley Rule & Level Plant, The

HAND SCREWS
Adjustable Clamp Company
Christiansen, C.
Cincinnati Tool Company

INKS—DRAFTING
Devoe & Raynolds Company
Dietzgen Company, Eugene
Higgins & Company, Chas. M.
Pease Company, The C. F.
Post Company, Frederick
U. S. Blue Company
Weber Company, F.

INKS—PRINTING
American Type Founders Co.
Barnhart Bros. & Spindler

JOINTERS
Crescent Machine Co., The
Gallmeyer & Livingston Co.
Hall & Brown Wdwkg. Mach. Co.
Heston & Anderson
Oliver Machinery Co.
Parks Wdwkg. Machine Co., The
Wallace & Co., J. D.
Yates-American Machine Co.

KNIVES
Bingler Sons, Inc., Chas. F.

LATHES—METALWORKING
Oliver Machinery Co.
Sebastian Lathe Company
Seneca Falls Machine Co.
South Bend Lathe Works

LATHES-WOODWOARKING
American Saw Mill Mchy. Co.
Blount Company, J. G.
Delta Manufacturing Co.
Hall & Brown Wdwkg. Mach. Co.
Midland Appliance Corp.
Oliver Machinery Co.
Parks Wdwkg. Machine Co., The
Seneca Falls Machine Co.
Wallace & Company, J. D.
Yates-American Machine Co.

LEATHER
Hall, W. A.

LEVELS
Millers Falls Company
Sargent & Company
Stanley Rule & Level Plant, The
Starrett Company, L. S.

LUMBER
Algoma Panel Company
American Walnut Mfrs. Ass'n
Fleischmann Transportation Co.
Indiana Quartered Oak Co.
Mid West Lumber Company
Paxton Lumber Co., Frank

MACHINE KNIVES
Atkins & Company, E. C.
Crescent Machine Co., The
Disston & Sons, Henry
Hall & Brown Wdwkg. Mach. Co.
Oliver Machinery Co.
Simonds Saw & Steel Co.
Yates-American Machine Co.

MANDRELS
Cleveland Twist Drill Company

MANUAL TRAINING BENCHES
Bemis, A. L.
Christiansen, C.
Gross Hdwe. & Supply Co., Ph.
Kewaunee Mfg. Company
Oliver Machinery Co.
Sheldon & Company, E. H.
Standard Pressed Steel Co.
Wallace & Company, J. D.

MANUAL TRAINING SUPPLIES
Gross Hdwe. & Supply Co., Ph.
Lussky, White & Coolidge, Inc.
National Manual Training & Supply Co.
Thurston Manual Training Supply Co.

MILLING MACHINES
Gallmeyer & Livingston Co.

MITRE BOXES
Atkins & Company, E. C.
Millers Falls Company
Stanley Rule & Level Plant, The

MODELING CLAY
Bradley Company, Milton
Devoe & Raynolds Company
Weber Company, F.

PANEL AND VENEER
Algoma Panel Company

PAPER CUTTERS
Challenge Machinery Co.
Chandler & Price Co., The

PASTE
American Crayon Company
Bradley Company, Milton
Devoe & Raynolds Company
Weber Company, F.

PENCILS
Dixon Crucible Company, Jos.
Weber Company, F.

PLANERS
American Saw Mill Mchy. Co.
Parks Wdwkg. Machine Co., The
Solem Machine Company
Wallace & Company, J. D.
Yates-American Machine Co.

PLANES
Sargent & Company
Stanley Rule & Level Plant, The

PORTABLE SANDING MACH.
Clarke Sanding Machine Co.
Porter-Cable Machine Company
Reid-Way Company
Wallace & Co., J. D.

PREPARED WAX
Johnson & Son, S. C.

PRINT SHOP ENVELOPE SERVICE
Western States Envelope Co.

PRINTING EQUIPMENT
American Type Founders Co.
Barnhart Brothers & Spindler
Wanner Machinery Company

PRINTING PRESSES
American Type Founders Co.
Barnhart Brothers & Spindler
Challenge Machinery Co.
Chandler & Price Co., The
Wanner Machinery Co.

PROOF PRESSES
American Type Founders Co.
Barnhart Brothers & Spindler
Vandercook & Sons

PUNCHES
Cincinnati Tool Company
Niagara Machine & Tool Works
Peck, Stow & Wilcox Co.

REAMERS
Cleveland Twist Drill Company
Morse Twist Drill & Machine Co.

RULES
Dietzgen Company, Eugene
Lufkin Rule Company
Pease Company, The C. F.
Sargent & Company
Stanley Rule & Level Plant, The

SANDERS
Clarke Sanding Machine Co.
Oliver Machinery Co.
Parks Wdwkg. Machine Co., The
Porter Cable Machine Co.
Reid-Way Company
Tecktonius Mfg. Co., E. C.
Wallace & Company, J. D.
Yates-American Machine Co.

SAWS
Atkins & Company, E. C.
Disston & Sons, Henry
Graham Co., Inc., John H.
Huther Bros. Saw Mfg. Co.
Millers Falls Company
Sargent & Company
Simonds Saw & Steel Co.
Starrett Company, L. S.

SAW BENCHES
American Saw Mill Mchy. Co.
Atkins & Co., E. C.
Crescent Machine Co., The
DeWalt Products Co. (Hand Portable)
Gallmeyer & Livingston Co.
Hall & Brown Wdwk. Mach. Co.
Heston & Anderson
Oliver Machinery Company
Parks Wdwkg. Machine Co., The
Porter Cable Machine Company
Wallace & Company, J. D.
Yates-American Machine Co.

SAW FILERS
Foley Saw Tool Company

SCREW DRIVERS
Cincinnati Tool Company
Jennings Mfg. Co., Russell
Millers Falls Company
North Bros. Mfg. Company
Sargent & Company
Stanley Rule & Level Plant, The
Starrett Company, L. S.

SEWING TABLES
Christiansen, C.
Kewaunee Mfg. Company

SHAPERS—WOODWORKING
American Saw Mill Mchy. Co.
Carter Company, B. L.
Crescent Machine Company
Gallmeyer & Livingston Co.
Hall & Brown Wdwg. Mach. Co.
Oliver Machinery Company
Parks Wdwkg. Machine Co., The
Yates-American Machine Co.

SHEET METAL
Amer. Sheet & Tin Plate Co.

SHEET METAL MACHINERY
Berger Brothers Company
Niagara Machine & Tool Works
Peck, Stow & Wilcox Co.

SHEET METAL TOOLS
Berger Brothers Company
Niagara Machine & Tool Works
Peck, Stow & Wilcox Co.

SHIP MODELS
Miniature Ship Models, Inc.

SQUARES
Disston & Sons, Henry
Peck, Stow & Wilcox Co.
Sargent & Company
Stanley Rule & Level Plant, The

STAINS
Dakalite Products Co., Inc.
Johnson & Sons, S. C.

TAPS AND DIES
Morse Twist Drill & Machine Co.

TIN PLATES
Amer. Sheet & Tin Plate Co.

TOOL GRINDERS
Atkins & Company, E. C.
Blount Company, J. G.
Clark, Jr., Electric Co., Jas.
Gallmeyer & Livingston Co.
Luther Grinder Mfg. Co.
Mummert-Dixon Company
Oliver Machinery Co.

TWINE
January & Wood Company

TWIST DRILLS
Cincinnati Tool Company
Cleveland Twist Drill Co.
Morse Twist Drill & Machine Co.

TYPE
American Type Founders Co.
Barnhart Bros. & Spindler

UPHOLSTERING SUPPLIES
Cincinnati Tool Company
Lussky, White & Coolidge, Inc.
Thurston Man. Trg. Supply Co.

VARNISHES
Dakalite Products Co., Inc.
Devoe & Raynolds Company
Grand Rapids Fibre Cord Co.
Johnson & Son, S. C.

VISES
Abernathy Vise & Tool Co.
Bemis, A. L.
Christiansen, C.
Columbian Vise & Mfg. Co., The
Columbia School Supply Co.
Luther Grinder Mfg. Co.
Millers Falls Company
Morgan Vise Company
North Bros. Mfg. Company
Oliver Machinery Company
Richards-Wilcox Mfg. Co.
Stanley Rule & Level Plant, The

WATER COLORS
American Crayon Company
Binney & Smith Company
Bradley Company, Milton
Devoe & Raynolds Company

WAX CRAYONS
American Crayon Company
Binney & Smith Company
Bradley Company, Milton
Dixon Crucible Company, Jos.

WEAVING MATERIALS
Grand Rapids Fibre Cord Co.
Thurston Man. Trg. Supply Co.

WOOD DYES
Dakalite Products Co., Inc.

WOOD PAPER DYES
Dakalite Products Co., Inc.

WOOD FINISHING MATERIALS
Dakalite Products Co., Inc.

WOODWORKERS' CLAMPS
Cincinnati Tool Company

WRENCHES
Cincinnati Tool Company
North Bros. Mfg. Company
Peck, Stow & Wilcox Company

ADVERTISERS REFERENCE INDEX

Abernathy Vise & Tool Co....53a
Adjustable Clamp Company..52a
Algoma Panel Company.....19a
American Chime Clock Co....51a
American Crayon Company....56a
American Saw Mill Mchy. Co.15a
Amer. Sheet & Tin Plate Co.14a
American Technical Society...44a
American Type Founders Co..39a
American Walnut Mfrs. Ass'n.34a
Atkins & Co., E. C....2nd Cover
Barnhart Bros. & Spindler.....3rd Cover
Beckwith Machine Company..51a
Bemis, A. L.....52a
Berger Brothers Co.....14a
Bingler Sons, Inc., Chas. F..53a
Binney & Smith Company....22a
Blount Co., J. G.....4th Cover
Bradley Company, Milton....23a
Bruce Publishing Co.....54a
Buffalo Forge Company.....50a
Carter Company, B. L.....10a
Century Company, The.....47a
Challenge Machinery Co.....40a
Cincinnati Tool Company..... 8a
Classified Wants Dept.....20a
Clark, Jr., Electric Co., Jas..12a
Clarke Sanding Machine Co.. 2a
Cleveland Stone Company....16a
Cleveland Twist Drill Co....30a
Columbian Vise & Mfg. Co., The.....14a
Columbia School Supply Co...52a
Crescent Machine Co., The... 2a
Dakalite Products Co., Inc...34a
Delta Manufacturing Co.....49a
Devoe & Raynolds Co.....22a
Dietzgen Co., Eugene.....40a
Disston & Sons, Henry..... 3a
Dixon Crucible Co., Jos.....22a
Fleischmann Transportation Co.52a
Foley Saw Tool Company....13a
Forster, Incorporated.....25a
Gallmeyer & Livingston Co...15a
Graham & Co., Inc., John H.17a
Grand Rapids Fibre Cord Co.42a
Hall, W. A.....18a
Hall & Brown Woodworking Machine Co..... 2a
Hartford Clamp Company....11a
Heston & Anderson..... 8a
Higgins & Co., Chas. M.....22a
Huther Bros. Saw Mfg. Co.... 8a
Indiana Quartered Oak Co....51a
Irwin Auger Bit Company....35a
January & Wood Co., Inc....24a
Jennings Mfg. Co., Russell...50a
Johnson Machine Co., Carlyle 6a
Johnson & Son, S. C..... 9a
Johnson Gas Appliance Co....14a
Kewaunee Mfg. Company.....41a
Liberty Electric Company....34a
Lufkin Rule Company, The...20a
Lumber Dealers' Directory....18a
Lussky, White & Coolidge, Inc.24a
Luther Grinder Mfg. Co.....10a
McGraw-Hill Book Co., Inc..25a
Maydole Hammer Co., David. 6a
Midland Appliance Corp.....47a
Mid West Lumber Company..51a
Miniature Ship Models, Inc..53a
Morgan Vise Company.....50a
Morse Twist Drill & Mach. Co. 6a
Mount Carmel Mfg. Co.....43a
Mummert-Dixon Co..... 4a
Natl. Manual Trg. Supply Co.50a
North Bros. Mfg. Company...32a
Oliver Machinery Co..... 5a
Parks Wdwkg. Mach. Co., The.16a
Paxton Lumber Co., Frank...18a
Pease Company, The C. F.... 1a
Peck, Stow & Wilcox Co.....37a
Porter Cable Machine Co.....10a
Post Company, Frederick.....24a
Practical Arts Pub. Co.....52a
Reid-Way Company.....12a
Rhodes Mfg. Company..... 4a
Richards-Wilcox Mfg. Co.....21a
Russell Electric Company.....17a
Sebastian Lathe Company....31a
Seneca Falls Machine Co....28a
Sheldon & Company, E. H...38a
Simonds Saw & Steel Co....12a
Simplex Air Model Co.....53a
Solem Machine Company.....16a
Sons Mfg. Company.....16a
South Bend Lathe Works....26a
Stanley Rule & Level Plant, The 29a
Starrett Company, L. S.....4c
Stearns & Company, E. C....15a
Teacher Agencies.....52a
Tecktonius Mfg. Co., E. C...17a
Thurston Manual Trg. Sup. Co.46a
U. S. Blue Company.....25a
University of Iowa.....52a
Vandercook & Sons.....40a
Wallace & Company, J. D... 7a
Weber Company, F.....47a
Western States Envelope Co..40a
Window Shoppers' Guide.48a, 50a
Yates-American Machine Co..33a

YOUR STUDENTS WILL BE MAKING HOLIDAY GIFTS THIS MONTH

Have them paint them with

"PRANG" TEMPERA and WATERCOLORS?

THE "OLD FAITHFUL" PRODUCTS

They are ideal for wood work, being quick drying and rich in color. A coat of shellac makes the colors waterproof.

SEND FOR OUR FREE COLOR CHARTS AND LITERATURE

THE AMERICAN CRAYON COMPANY

"Old Faithful"

HOME OFFICE AND FACTORIES 620-720 HAYES AVE., SANDUSKY, OHIO

NEW YORK OFFICE: 130 WEST FORTY-SECOND STREET
SAN FRANCISCO · 116 NEW MONTGOMERY STREET
DALLAS, TEXAS · SANTA FE BUILDING

LEADERSHIP SINCE 1835
93 Years of Faithful Service

Gerstmeyer Tech. High School, Terre Haute, Indiana
Harding Jr. High School, Steubenville, Ohio
Vocational High School, Fort Worth, Texas
Masonic Home and School, Fort Worth, Texas

Among the basic school subjects PRINTING *is second to none in its educational influence*

To give to young people an opportunity for the greatest amount of success in life—to give them a fair start—is the desire of every school system. As no other form of work correlates with more lines of school work than does the printing subject, and none is more interesting, it may be profitably offered in every school, whether large or small. Not only do students of printing receive the benefit of the course, but the school system as a whole is helped, as its influence goes beyond the room where it is taught.

Educators who want to be well informed on the printing subject should write for a copy of *"The School Printing Department,"* a brochure that explains it fully.

BARNHART BROTHERS & SPINDLER

Department of Educational Research
MONROE AND THROOP STREETS, CHICAGO, ILLINOIS

Safety!
Service!
Satisfaction!

It's a "Blount"

J. G. BLOUNT CO. EVERETT, MASS.